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The role of proactive notifications in electronic Logistics Service Quality (e-LSQ)

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Alla mia famiglia,
per l'amore incondizionato.

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INTRODUCTION

Over the past two decades, as the internet has become increasingly widespread, retailers and consumers have discovered fresh opportunities for engagement

This study explores customer satisfaction in relation to last mile delivery, the final phase of the online shopping experience. This process concerns all activities taking place from the moment a customer places an order on an e-commerce website, to the moment the purchase is delivered.

The research originated from an interest in uncovering innovative methods to improve last mile delivery. The strategy suggested involves employing proactive notifications: alerts sent by an e-retailer to customers who have placed an order, in absence of specific demands, with the purpose of informing about the status of a delivery. In the paper, the role of product type is investigated in the relationship between proactive notifications and customer satisfaction as a moderation variable. Two types of products were presented to manipulate the variable, on the basis of traditional product classification scheme: one specialty good (a laptop) and one convenience good (a washing machine detergent),

In the first chapter of this paper is offered an overview of the concept of last mile delivery. Firstly, conditions that have led to the advent of e-commerce are explained, in particular the spread of the internet. Secondly, consumers' perspectives are explored. Consumers have experienced recent changes in desires and expectations, mainly driven by technological progress and new habits. Thirdly, as consumers modified their approach to last mile delivery, firms had to transform in order to provide last mile delivery services. Paragraph 1.2.2 focuses on the challenges that companies encounter when developing last mile logistics processes and suggests methods to elevate their service. Finally, the last paragraphs explore recent developments in the last mile delivery sector, specifically those occurred simultaneously or as a consequence of the Covid-19 pandemic, and those emerged as a result of technological progress.

The second chapter of this paper is dedicated to investigating academic literature pertaining to last mile delivery and to the development of the conceptual model. After presenting an overview of home delivery services, the chapter offers a brief summary of customer satisfaction in its academic frame and in relation to order fulfillment processes. Prior to focusing on the concepts of order tracking and proactive notifications, the research question is stated. Paragraphs 2.3 and 2.5 review the academic streams of research that led to the choice of proactive notifications as the independent variable of the studied model. Following, literature on different product types and their role in the last mile delivery

sphere is examined. Lastly, the paragraph analyzes research concerning familiarity with online shopping, which will be analyzed as a covariate in the proposed conceptual framework.

The third and final chapter displays the analysis process in detail, from the choice of the stimuli to the final results of the study. After a discussion concerning the results obtained, the chapter exhibits the limitations carried by the current study. Theoretical and managerial implications are presented. Lastly, direction for future research are highlighted in the final paragraph.

CHAPTER 1 LAST MILE DELIVERY

1. E-commerce figures

Globalization and the internet era are definitively shaping a new era of competition, which requires marketing managers to embrace new challenges and opportunities from this hyperconnected world. In 2022, there were approximately 5.3 billion internet users worldwide. The number went up 0.4 billion compared to the year before. Based on this estimate, 66% of the global population is an internet user (Statista, 2023).

Moreover, in April 2023 Northen Europe recorded the highest internet penetration rate ever, reaching 97% of the total population. Western Europe came right after, having 93.5% of its population on the internet. In general, worldwide – even including under-developed countries - internet penetration rate is estimated at 64.6%which means there are 5.19 billion internet users and this numbers is growing at an annual average rate of 2.1% (Datareportal, Digital 2023).

As a consequence, in the last decade, the enormous amount of people using the internet has contributed to an incredible growth of e-commerce sales and business.

Indeed, in 2021 almost 20% of all retail sales around the globe was made online. Compared to the year before, the number of online sales increased by 17.1%. Previsions estimated that in less than three years, in 2026, e-commerce sales will represent almost a quarter of all retail sales worldwide. (Statista, 2023). These estimates become even more relevant as the new generations of digital natives become the biggest segment in the global market: the transition from Baby-boomers, to Millennials, to Generation Alpha and Z will accelerate this growth. In 2022, 55.9% of internet users aged 16 to 64 buy something online every week (Datareportal, Digital 2023).

In recent years, e-commerce has become available on many different platforms. In particular, it has landed on social media. In 2021, in fact, more than 50% of U.S. social media users between 18 and 24 years old have made a purchase through social media.

U.S. Census Bureau stated that at the end of the first quarter of 2023, sales from e-commerce summed up to $253.1 billion.

E-commerce businesses are those businesses that "sell products and services using digital methods". Operating through e-commerce provides enormous advantages to firms and businesses, with respect to operating in a purely offline environment. By selling their products online, companies can overcome geographical limitations and gain the possibility of widening their client base. Forbes (2023) states that, due to costs associated with physical stores, like renting and assurance costs, it is more expensive to open and run a brick-and-mortar store than to build an e-commerce. There are

numerous further benefits associated with e-commerce sales: flexibility of opening hours and collection of customer data are just some of them.

In order to provide an online shopping service to consumers, firms need more than just an e-commerce website where customers can view the products and place the orders. The orders placed by customers need to be shipped to their final destination. Companies and businesses that operate in the B2C sector must, therefore, provide a shipping service which delivers products to the final customers.

1.2 Last mile delivery: an overview

Last mile delivery is the final step of the boundless and elaborate processes that constitute the supply chain.

DHL, one of the biggest providers of logistics services in the world, defines last mile delivery as the "*the final movement of goods from a business to its consumer*" (DHL 2022). Usually, the destination of goods which undergo last mile delivery is consumers' residence. Today, last mile delivery is a critical process for companies. Consumers expect their purchases to be delivered quickly and efficiently.

By 2027, the global last mile delivery market is expected to grow to more than 200 billion U.S. dollars from 108.1 billion U.S. dollars in 2020. The growth of the last mile delivery market is led by the increased number of online orders. (Statista, 2023)

Deloitte's Retail Industry Outlook, which analyzes areas of focus and challenges for retailers every year, lists three key dimensions for 2023: social commerce , reverse logistics and, finally, supply chain and last mile capabilities. Investing heavily in fulfillment capabilities is considered as a key long-term strategic initiative, taken by retail leaders which are expected to have EPS growth over the next three years.

Seven out of ten leaders say that they are placing attention on enhancing their last mile services through the use of technologies. (Deloitte, 2023)

The change is happening because retailers have noticed a transformation in the approach and expectations of customers, who desire to be offered multiple last mile solutions. (Statista, 2022b)

The last mile delivery industry has received heavy investments in the last few years.

In 2020, the last-mile delivery startups market in North America was subject to a nine billion U.S. dollar investment, and the total last mile delivery market was evaluated at 39.9 billion U.S. dollars.

1.2.1 The customers' point of view

Consumers are not satisfied with delivery services.

In 2018 a survey was conducted concerning the level of satisfaction with the last mile delivery sector; it was found that the Net Promoter Score of the services provided, worldwide, was –9. The U.S. had the best rating (9), while France was found to have the worst one (-29). (Statista, 2022)

Capgemini Research Institute (2019) has conducted a deep analysis of last mile delivery state and the level of satisfaction with last mile delivery services in consumers. The research found that consumers are not satisfied with the current state of last mile delivery: these kinds of services, in fact, receive a negative Net Promoter Score (-9) on average across all geographic markets.

In many markets, delivery has become a fundamental consumer expectation. In the food and grocery sector, for instance, 40% of consumers claim that "delivery services are a must-have for food and grocery categories", especially in urban areas, where public transportation is highly crowded during rush hours. The approach to food and groceries' shopping has also changed: consumers no longer wait for the weekend or for their free time to purchase food items, instead they tend to buy them online whenever they need them. Delivery services have become so important that 55% of consumers say that they would switch to a new provider if it offered a faster delivery service.

Overall, providing consumers with a satisfying delivery service has a number of positive effects on the provider: high customer retention rates, increase of positive word of mouth (82% of satisfied customers will spread positive reviews of the retailers to their friends and family, 58% will share positive feedback on social media) and increment in consumers' willingness to pay (53% will purchase paid memberships for delivery, 73% would be more willing to try new offerings, 74% state that they will actually increase their spending with the retailer). (Capgemini Institute, 2019)

On the other hand, out of consumers who experience poor delivery services, 48% state their intention of terminating their purchases from the retailer who provided them with an unsatisfying experience, while those who will keep on purchasing will decrease their spending by 45%.

IMRG has conducted a survey among 1000 UK online shoppers, investigating the factors affecting reviews of last mile delivery. The first element of focus is the importance of providing a good service, in order to avoid receiving a negative review. Almost 50% of the respondents, in fact, claimed to either *always* leave a review after receiving an item, or that they are *likely* going to. Only 2.6% of the respondents affirm to never leave a review.

One of the main reasons why customers leave a bad review, was found to be *insufficient or little-to-no post purchase communication* (around 41% of respondents).

One way to communicate with customers between the purchase moment and the delivery, is to keep customers informed by sending delivery updates. Although customers would prefer to receive updates from the retailer rather than the delivery partner, this is not fundamental, as long as the retailer plays some kind of role in the delivery and does not make the customers feel like they have been abandoned.

In order to further enhance the last mile delivery service, one possibility is to send personalized offers to customers, along with the information about delivery status. 54% of respondents, in fact, said that they would like to receive this kind of offer, when receiving shipping updates. (IMGR, 2023)

Firms need to focus their attention on providing a last mile delivery experience tailored around consumers' desires and necessities. As it happens for other sectors, consumers need to be at the center, when designing a last mile delivery strategy.

Accenture (2022) identified the pillars on which retailers should base their actions, in order to provide consumers with a targeted delivery experience.

- The first pillar concerns the *time of delivery*: consumers must be able to decide when their delivery should arrive, according to their preferences. In particular, flexibility has become an essential aspect required by consumers, as 73% of consumers declared that receiving the delivery in a convenient time slot is more important than receiving it quickly. Accordingly, firms should be able to offer a high grade of flexibility regarding the possible delivery time windows.

- The second pillar is *Location* as one more fundamental area that firms can enhance and from which they can gain competitive advantage. Most households nowadays do not have someone who has the possibility of waiting at home for a delivery; instead, people's routines are not as established as before, and life moves faster. Therefore, companies and retailers must provide numerous delivery locations to consumers, in order to allow them to collect their purchases in accordance with their everyday necessities. Examples are office deliveries and pick up locations. Of course, it is not simple for retailers to set up these kinds of solutions. The problems that firms are forced to face when trying to make their last mile delivery services consumer centric are going to be analyzed in another paragraph. In some situations, customers have taken the problem into their own hands and have applied a solution called "delivery captain": one customer acts as a sorting center for other customers, by receiving all the deliveries and distributing them to other customers.

- The fourth pillar is *order transparency* and it is about offering consumers the possibility of being informed about every step of the delivery of their purchases. Consumers expect complete transparency, from the moment they place the order to the moment they receive it. Therefore, it is not enough to provide an online tracking service. Retailers should communicate in real time to consumers, starting from the expected delivery date, coming to every movement of their purchase. Furthermore, all of these stages, which represent separate check points for firms, are perceived by consumers as different steps of the same process. Consumers expect the passage from the ordering page to the tracking one to be smooth and simple.

- Consumers' priorities have changed in the last decade: environmental concerns have become part of everyday life and thoughts. This is the reason that led Accenture to list *Sustainability* as another pillar of last mile delivery. Consumers want to have the ability to choose among more sustainable delivery solutions, for example through the use of recyclable packaging or bundled deliveries, which allow firms to make only one shipment that incorporates more orders. Working conditions must be fair and transparent, in order to provide customers with a clear vision of what they are financing.

- Lastly, firms should focus on offering a smooth *Customer Journey*, from beginning to end. Besides all of the factors cited above, one element that offers large space for improvement is the integration between the retailer and the delivery parties.

PwC (2023) has also underlined this element, by stating that firms need to push collaboration between carriers and retailers. In Hamburg, for instance, there is a shopping center, also called multi-label parcel shops, where multiple providers are cooperating. Customers can, in fact, drop off and pick up packages from DPD, Hermes, GLS and UPS.

1.2.2 The firms' point of view

McKinsey (2021) underlined a critical aspect of online sales. The growth of online sales is expected to represent 100% of the total retail sales increase of the next three years; however, margins will drastically decrease.

By analyzing total shareholder returns (TSR) of 100 big retailers between 2016 and 2020, McKinsey found that, among the retailers laying in the worst quarantine, while the share of revenue for e-commerce grew by 16%, margins dropped by 5% in the same period of time. Retailers must become aware that, due to the difficulties in making them profitable, it is not sufficient to make a large number of online sales to significantly increase earnings. Developing a strategy that takes into consideration this dynamic is fundamental to generate profit and value.

Fulfillment and delivery represent high variable costs for retailers, which are extremely difficult to manage. In fact, it is a demanding task for retailers to conciliate the high variable costs deriving from delivery services with consumers' desire for low delivery fees.

Accenture reports that 53% of the total cost of shipping derives from last mile delivery, which alone represents 43% of total supply chain costs.

Basically, last mile delivery is the highest cost that firms have to bear.

Companies have started to look for creative solutions and developing new business models in order to be able to reduce the costs of last mile delivery, or even to make profit out of it.

As reported by the Financial Times, for instance, the last mile delivery aspect of e-commerce is so critical and difficult to handle, that Amazon has decided to use its network to provide such service to its competitors. Multi-Channel Fulfillment by Amazon (MCF) is a subdivision of Amazon, which offers storage, packaging and delivery to e-sellers like Walmart, eBay, Etsy, Shopify and several others. It may seem contradictory for Amazon to make it simpler to sell on other stores; however, the practice is highly profitable due to the push from sellers who increasingly seek to diversify where they place their products, in order to provide a higher quality delivery.

However, retailers are not yet focused on this aspect. In fact, the Financial Times reports that only 30% of organizations list low delivery cost as a top priority.

Besides representing a huge cost for firms, last mile delivery has an enormous environmental impact. The World Economic Forum (2020) predicts a 36% increase in the number of vehicles on the road by 2030; as a consequence, the average commute could grow by 21% by the same year, uniquely due to last-mile delivery traffic.

Accenture (2021), in a report concerning new perspectives for making the last-mile ecosystem more sustainable, underlined three points of attention for firms.

The first one, *"Incentivize greener choices"*, pushes companies to provide more sustainable delivery options to their consumers, in order to give them the ability to choose.

One practical example is the method used by Shopify: consumers can decide to round the amount they have to pay for their purchase to the nearest dollar, in order to contribute to reducing their carbon footprint.

Businesses can also give customers the choice of picking up their parcel at a local fulfillment center, in exchange for an offer or discount. The model developed by the consulting firm, simulated a world where customers located near a fulfillment (not further than one kilometer) center picked up their deliveries by foot. If this was the case, almost 15% of deliveries in London would become zero-emissions. consumers are not the only ones that can be included in the *Incentivize greener choices* resolution. Governments should incentivize logistics and delivery businesses to acquire low-emission vehicles. Furthermore, route management should be studied not only by companies but also by administrative organs. In general, a higher integration among companies and government arms would produce a more efficient commitment towards sustainable last mile delivery.

Another strategy that companies can implement is to *rethink asset use.* Urban areas are full of facilities, buildings, physical stores and other structures that have fixed roles. All of these assets can be rethought and put to use in a new and more efficient manner. One example of this process is given by the City of London, where space at the Wall Car Park that gets under-used is going to be used as a sustainable hub by Amazon Logistics: carriers are going to deliver packages by foot and bicycle.

Moreover, spaces and networks can be shared by different companies. This can help businesses to reduce redundancies and emissions.

Lastly, the report suggests companies to *Harness data and analytics* in order to reduce emissions of last mile delivery. This measure alone is less effective than switching completely to micro-fulfillment centers; however, if the two could operate together, the consulting firm calculated that emission could be further decreased between 7 and 9% in the cities included in the study. In particular, making a better use of data, can help to develop efficient route management. DHL, for example, has founded a startup company called Greenplan, which has developed an algorithm that is able to create routes for deliveries according to vehicle characteristics and their emissions and traffic flows.

Last-mile deliveries have a significant impact on our everyday life, whether we realize it or not. Especially in urban areas, deliveries do not only raise the level of pollution and emissions, instead, they are also the cause of an enormous traffic volume. The World Economic Forum has published a report on future perspectives of last-mile delivery sustainability. To reduce the giant level of traffic deriving from deliveries, the report suggests increasing drastically the level of traffic regulation in urban areas. However, firms are already investing in algorithms that calculate the best routes for couriers, in order to reduce traffic and emissions.

1.3 Last mile delivery: emerging trends

1.3.1 The impact of Covid-19

In 2020, due to the pandemic that spread around the world, the number of B2C deliveries grew by 25%, and the growth did not set back once the emergency ended.

Covid-19 pandemic has had a large impact on many aspects of our everyday life and our society. Some measures and habits that had become normal during the sanitary emergency have then been overcome, like face masks, while others have not. In particular, the way consumers shop has transformed, and those changes persist till today.

The World Economic Forum in collaboration with McKinsey has produced a report that analyzes the most significant structural changes, influenced by the pandemic, that affected the last mile delivery industry.

Firstly, although the last mile delivery industry has already been experimenting with technological innovations for some time, Covid-19 has magnified this phenomenon. In particular, customers wanted to have the possibility of receiving contactless deliveries, since seeing other people raised the probability of infection. As a consequence, firms increased their investments in autonomous vehicles. (Forbes, 2020).

Linked to the first main effect of Covid-19 on last mile delivery, the second one also concerns vehicles and delivery technologies: *Decarbonization*. As for the development of autonomous vehicles, decarbonization, which is the development and the instatement of low or zero emissions vehicles, was already gaining firms attention and investments. However, Covid-19 promoted decarbonization even more.

As already stated in other paragraphs of this paper, another change that characterized the last mile delivery sector in the last few years, especially as a consequence of the pandemic, is the ever-growing consumers' intention of buying online and taking into consideration the environmental impact of their purchases. Consumers' tendency to buy online instead of in-store has affected several categories, from personal care items to home and gardening supplies.

Although the evolution of new technologies proceeded at a fast pace during the pandemic, the use of instruments of which the value had already been recognized has risen as well. Parcel lockers, for example, have been installed in many locations.

Lastly, companies have undertaken the necessity of providing more sustainable delivery options by originating new business models. platforms for cars and scooters sharing have spread widely, and the use of e-bicycles has become popular among delivery firms.

1.3.2 Emerging solutions and perspectives

As explained in the paragraphs above, focusing on how to improve their last mile delivery services should represent a priority for firms.

Retailers and stores can adopt different strategies in order to enhance their last mile delivery services. We have gotten used to many of the fulfillment strategies that just a few years ago transformed our way of getting deliveries: parcel lockers and ordering online to pick-up in store do not represent innovations anymore. Companies, however, are still looking to advance their offerings.

One of the many approaches that has been taken was increasing the number of possible fulfillment locations.

Already in 2017, in an article published by Forbes, Arthur R. talked about a few experiments that were being conducted by car production companies in collaboration with retail stores. In particular, Jaguar Land Rover and John Lewis (a department store from the UK), were working together to create a market for deliveries to cars. Customers only had to install a black box that would allow the delivery person to open the trunk, put the package in the car and lock the car afterwards. The trial was not successful due to a series of difficulties; however, the idea of finding new ways to improve last mile delivery by raising the number of possible fulfillment points was brought on by many firms and new technologies are being tested.

Local fulfillment is one of the enhancements that has been put in place during the pandemic, in order to provide a faster last mile delivery service to customers and to reduce carbon emission. The strategy consists in placing numerous micro-fulfillment centers on the territory, which allow for deliveries to travel shorter distances to reach customers.

Amazon was the first firm to invest in local (or market-based) fulfillment. This was the method that firstly allowed companies to offer same-day delivery.

Accenture produced a complete report on local fulfillment, collecting and analyzing data from three different large cities: Chicago, London and Sydney. The research showed that providing customers with faster delivery was not the only outcome produced by the newly adopted strategy; instead, implementing local fulfillment also represents a sustainable choice for firms. If the process of last mile delivery was implemented through local fulfillment centers, in fact, carbon emissions would be subject to a decrease between 17 and 26%, by 2025. The decrease would be caused by a reduction of delivery traffic.

A report from The World Economic Forum (2020) has summarized the most popular initiatives studied by cities, regarding last-mile deliveries challenges, and their predicted impact on three dimensions: people, planet and profit.

Although there is no single intervention that, alone, can solve the majority of problems, there are some interventions that can produce a positive effect on one dimension. For instance, electric vehicles can reduce emissions by 16%, while H2 vehicles can reduce them by 24%. Until now, only innovations concerning vehicles that move on traditional routes have been taken into consideration. However, there is one technology which has not been nominated, although it has been a top priority for logistics companies to implement: drones.

McKinsey has investigated the potential competitive advantage that drones can bring to companies around the world. Drones are more environmentally friendly than all their road competitors, both gasoline and electric powered ones. Moreover, drones may already be the most appropriate and efficient instrument to complete deliveries, for example in regions where geographical reachability by road is low.

However, current regulations in most regions state that one person can only control one drone at a time, and that there always has to be a person overlooking a drone movement. This implicates extremely high labor costs, making drones less cost-effective than vans or cars.

Crowdsourced deliveries represent one more strategy that companies have been applying to provide fast deliveries to their customers. The crowdsourcing method consists in hiring non-professional local couriers that use their own vehicles to make deliveries. In the last years this strategy has been most utilized in the food and drinks sector, where numerous different platforms have emerged that offer

this service. Urban areas represent the places where crowdsourced delivery has become more popular over the years. McKinsey (2017) has shown in a report that, in only 3 years, urban delivery startups have received almost 5 billion U.S. dollars fundings. The industry is extremely profitable, due to Daivd Sacks's "virtuous cycle": as the geographic area covered by the service grows, the speed of pick ups accelerates, and the demand from customers rises. Furthermore, if the geographical area keeps enlarging, the courier's downtime keeps reducing and costs for firms decrease. Customers can then receive deliveries at a lower price, which will, in turn, cause a further growth of the demand.

CHAPTER 2 LITERATURE REVIEW AND DEVELOPMENT OF CONCEPTUAL FRAMEWORK

2. Customer Satisfaction

Customer satisfaction is "the customer's evaluation of a product or service in terms of whether that product or service has met the customer's need and expectations" (Zeithaml et al., 2009)

The foundations of this definition rely on the "expectations disconfirmation paradigm" according to which customer satisfaction can be measured in relation to previous expectation about a a product or a service (Patterson et al., 1997). Indeed, when going to the customer decision journey of a product or service, customers usually form expectations in all the pre-purchase stages, which can then be confirmed, exceeded or disconfirmed, during the post-purchase evaluation of the chosen good/service performance. Literature has found that expectations can be various and of different kinds, i.e. ideal, expected, about costs or about social value ((Zeithaml et al., 1993). Customer satisfaction is directly influenced by disconfirmation and affects customers' behavior and re-purchase intentions.

In the context of service quality, Parasuraman, A., Zeithaml, V. A., & Berry, L. L. (1994) have developed a model to measure service quality perception and customer satisfaction on the basis of the expectations disconfirmation paradigm. The model, called SERVQUAL, measures five different dimensions of service quality – namely: reliability, assurance, tangibles, empathy, responsiveness.

Dimension	Definition
Reliability	Ability to perform the promised, dependably and accurately
Assurance	Knowledge and curtesy of employees and their ability to inspire trust and confidence
Tangibles	Physical facilities, equipment, and appearance of personnel
Empathy	Caring, individualized attention the firm provides its customers
Responsiveness	Willingness to help customers and provide prompt service

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Table 1.1 SERVQUAL dimensions

The five dimensions identify five possible touchpoints where customers' expectations may be different than the delivered service, therefore creating gaps, or disconfirmations, and lowering service perceived quality and customer satisfaction.

As e-commerce services became more and more in demand by customers, measures for service quality had to adapt to incorporate phases and processes related to the online shopping experience, which did not exist before. In the coming paragraphs it is analyzed how research has added to the previous service quality models in order to develop frameworks to measure e-service quality.

2.1 Home delivery services

In today's world, e-commerce and m-commerce (mobile commerce) have become extremely popular among consumers. Online shopping offers a higher level of convenience to consumers than an in store shopping experience (Jiang et al., 2013). The current shopping situation forces consumers and firms to focus their attention on factors affecting the online shopping experience. One of the main elements that can enhance consumers' experience is the delivery service of their purchase. Many researchers have underlined the importance of upgrading companies' logistics and delivery services in order to improve consumers' experiences (Mentzer et al.,1989) (Nguyen et al., 2019)(Tang et al., 2019).

  As will be shown, literature has demonstrated the ability of firms' delivery services to impact consumers' behavioral intentions, in many different ways, from the initial purchase decision to positive WOM.

The problem of how firms can innovate their delivery service has been analyzed from many different perspectives, and many possible solutions have emerged.

Some researchers have focused on the problems faced by delivery personnel when delivering a package (missing elevators or doorbells, signature requirements, wrong addresses...) and proposed self-service parcel delivery (Chen et al., 2018).

However, not all consumers have easy access to pick-up points or simply still prefer to receive their purchase at home, finding it more convenient. In fact, innovativeness and optimism have been found to be significant characteristics in the process that leads a consumer to the decision of using a parcel locker.

Problems in home delivery also concern curriers' difficulties in reaching consumers' houses because of intense traffic in urban areas. Scholars have suggested the use of drones and automated vehicles to manage these kinds of issues. Although it may become possible in the near future to use this kind of technology, it is still very complicated as of today, due to the many concerns it raises (privacy, reliability, high costs etc.).

During Covid-19 pandemic, home delivery became not only convenient, but necessary, especially in countries where lockdowns were mandatory. Consumers who did not have the choice of buying products in-store, became used to receiving their purchase at home.

2.2 E-service quality and e-logistics service quality (E-LSQ)

Since the growth of e-commerce services, the necessity of analyzing e-service quality and developing models to measure it has emerged.

Initial studies on the quality of e-services mostly examined how customers interacted with businesses' websites. (Loiacono et al., 2002), (Yoo, B., & Donthu, N. 2014)

Loiacono et al. (2002) published the WebQual, a scale composed of twelve dimensions, useful to measure a website quality. Yoo and Donthu's (2001) SITEQUAL had the same objective, as did Chen and Wells's (1999) AST, "Attitude towards the site".

According to the above cited scales, numerous attributes were found to have an impact on overall e-service quality, which influences customer satisfaction and re-purchase intention. In particular, the quality of information provided by the website, website organization and convenience, the product selection available and the availability of products, the possibility of website personalization are all significant factors.

However, the models that had been developed with the goal of measuring website quality in order to assess overall e-service quality perceived by the customers, failed to take into consideration numerous factors and variables that, as was later discovered, were fundamental to offer a satisfactory online shopping experience.

Collier J.E. and Bienstock C.C. (2006) overcame the previous models, by developing a framework for evaluating the quality of e-services, that took into account the effect of three dimensions, namely process quality, outcome quality, recovery, all of which are influenced by various first-order dimensions.

Logistics Service Quality (LSQ) refers to the ability of logistics services to be aligned with or to surpass customers' expectations (Lin et al. 2023).

Mentzer et al. (1989) firstly referred to logistics service quality as "one of the most important aspects of marketing". In recent years, due to the immense growth of e-commerce processes, LSQ has received more attention from researchers and many frameworks for measuring it were developed. (Parasuraman et al., 2005;Wolfinbarger et al,. 2003;Yang et al., 2004; Blut et al., 2015).

Effective logistics can represent an element of competitive advantage to e-retailers (Nguyen et al., 2019)(Tang et al., 2019)

More recent literature has identified, besides website quality, physical distribution service quality (PDSQ) (Xing et al., 2010) and reverse logistics (Griffs et al., 2012) as factors contributing to e-retailing service quality.

Physical distribution service quality is measured through various dimensions, namely: product availability, timely delivery, shipment condition and order tracking (Griffs et al., 2012; Koufteros et al., 2014; Xing et al., 2010; Murfield et al., 2017; Rao et al., 2011a,b).

Scholars have deepened their knowledge of e-LSQ by not only developing models to measure it as a whole, but also by investigating the effects on customers of single aspects and dimensions that belong to the broader category.

2.3 Order fulfillment and last mile delivery.

As will be shown in the next paragraph, when referring to B2C transactions, in particular retail e-shopping, scholars have not adopted a universal definition of what constitutes the order fulfillment process of an online purchase. Academic literature tends to interchangeably use the terms "order fulfillment" and "last mile delivery". Most of the time, in fact, order fulfillment is analyzed as the series of procedures that begin right after an order has been placed and end when it reaches the consumer. When the term is used in economic literature, instead, order fulfillment operations typically comprehend, in addition to the ones specified above, all of those actions taken by companies before orders are shipped, for instance collecting items and packing them. In this framework, last mile delivery is considered as only one of the elements that compose fulfillment as a whole. This semantic misalignment occurs, clearly, due to the different points of view taken when conducting research: when studying companies' operations from their perspective, every step of the process is clear and visible. Differently, customers who place and receive their orders are not able to see those operations that take place between these two moments, therefore do not have the ability to evaluate them, nor can they be affected by them, for the most part. The sole measure related to this concept, that affects customers' behavior, is called order accuracy: it measures the potential presence and severity of mistakes made by the retailer regarding the content of the order (missing or wrong items), and it is included in the majority of models developed to quantify online service quality.

In the next paragraph, it will be shown how scholars have investigated the role of order fulfillment and its underlying dimensions.

2.3.1 Order fulfillment and Customer Satisfaction.

In the context of offline purchases, the consumers' physical experience was influenced by the interaction with the store's atmosphere, looks and personnel; differently, in the online domain, it is the retailer who is accountable for managing the tangible aspects of the purchase (Xing et al., 2010). Physical Distribution (PD) is typically seen as a component of an organization's outward logistics which deals with finished goods and represents a touchpoint between the organization and its clients; it's what is also called last mile delivery.

These aspects should be widely researched, as "order fulfillment is the essence of electronic Physical Distribution Service quality (e-PDSQ) in online retailing". Numerous authors have examined the role of order fulfillment and last mile delivery in B2C contexts.

Ordering and fulfillment have been identified as two distinct stages of the process that need to be examined individually by Liao et al. (2010) in their analysis of the antecedents of e-shopping behavior.

Both stages affect customer satisfaction, which is further split in two: order satisfaction and fulfillment satisfaction. The fulfillment stage occurs chronologically after the ordering phase: it starts once this former is completed, and it involves all of the steps related to the delivery of the products, in addition to the level of support received after placing the order. Therefore, satisfaction with the fulfillment stage is driven by elements that should be examined separately from those which affect satisfaction with the ordering process. Furthermore, the author has demonstrated that satisfaction has a positive effect on customers' intention to continue using a e-retailer. However, while strong efforts have been made with the purpose of improving the ordering stage of a purchase process, "e-tailers should strive to enhance their order fulfillment ability".

Similarly, Cao et al. (2003) have analyzed the online buying process from an e-talier following chronological order: firstly, the ordering process, and secondly, once the first step is completed, the fulfillment process. The two separate steps have different measures that affect customer satisfaction. Once again, the order fulfillment stage is considered to include those operations which take place from the moment when the order has been placed, until it reaches the customer. The authors stated that "satisfaction with the fulfillment process is key to building a long-term relationship with an on-line consumer" (Cao et al., 2003).

Rao et al. (2011b) stated that order fulfillment becomes a "key differentiator for online retailers who hope to generate customer loyalty". The researchers, studying the effect of order fulfillment glitches, found that it is not enough to maximize efforts in order to avoid this kind of occurrences: it is necessary to reduce the impact of customers' anxiety regarding the delivery of a purchase, in order to preserve re-purchase intention. The order fulfillment phase, analogously to the previously cited

studies, concerns the activities related to the delivery of customers' orders; fulfillment glitches, in fact, were simulated by delaying orders deliveries beyond the pre-specified time frame. The purpose of this paper is to analyze one possible way to enhance the last mile delivery process. The findings from Rao et al. 's research are related only to one product category, thus giving the possibility to researchers to test for effects when more than one product category is involved.

Customers have various expectations regarding the order fulfillment process, as demonstrated by Thirumalai and Sinha (2005). It is widely recognized that consumers' expectations are related to their level of satisfaction, according to the customer satisfaction/dissatisfaction paradigm (CS/D). By demonstrating that customers expect different levels of order fulfillment quality, the authors highlighted the importance for retailers to enhance their fulfillment process by incorporating the use of technologies and other strategies. In this case, the authors recognize as "order fulfillment", in addition to the last mile delivery operations, the customers' evaluations of products' quality and functionality.

Managers should strategize in order to ensure a high-quality fulfillment by enhancing the characteristics of this process, since order fulfillment has a significant influence on customers' repurchase intention (Cho, 2015)

To assess order fulfillment performances, the researcher measures customer perceptions regarding delivery and customer support, which are dimensions related to the last mile delivery concept.

Blut et al. (2015) tested a model to measure overall e-service quality. The model included four dimensions: Website design, Fulfillment, Customer Service and Security. They stated that all four dimensions and their respective attributes are fundamental to measure overall e-service quality, which has a significant link to customer satisfaction. The fulfillment dimension, in particular, concerns delivery items and accuracy of the order. In their research, countries' cultural aspects play an important role as moderators. The authors underline the importance of uncertainty avoidance and masculinity as cultural dimensions impacting e-service quality perception; both dimensions score high in the Italian context, therefore it would be interesting to explore the role of each construct's dimension and their impact on customer satisfaction in the Italian frame of reference.

The role of order fulfillment and delivery quality of an online purchase has been examined also according to the entity of the e-retailer: market leaders and niche providers. Delivery aspects are found to be an element of focus for both kinds of providers, since they significantly affect customer satisfaction, which " ultimately contributes to higher customer loyalty and leads to recommendations, resales, and cross-selling effects" (Brusch et al., 2019). Regarding niche providers in particular, customers decide to shop again because they feel like a more personal relationship has been generated, through for example a reliable delivery.

Al-Adwan et al., (2019) examined the effect of logistics service quality (LSQ) on e-satisfaction and, subsequently, on e-loyalty, in the Web 2.0 context. In this case, LSQ is defined as "delivering the right product, at the right customer, at the right time", therefore is completely aligned with last mile delivery concept. Both dimensions (social component and logistics) affect e-satisfaction. The author therefore, identifies logistics as a plausible trait to add value and create competitive advantage.

This leads to the formulation of the following research question: *How can order fulfillment be improved through the use of technology, in order to impact customer satisfaction?*

2.4 Order tracking

Collier and Bienstok (2006) firstly showed that when consumers place an order online, the evaluation of the e-service quality provided by the retailer is comprehensive of a series of factors, namely: design, information accuracy, privacy, functionality, and ease of use of a website. Furthermore, the authors show that consumers also evaluate the outcome quality of an online purchase, which is defined by three main dimensions: order condition, accuracy, and timeliness. It is fundamental for customers to receive enough and accurate information not only about the product they are purchasing, but also about its delivery.

Thirumalai et al. (2008) also found that order tracking is a necessary measure affecting customer satisfaction with order fulfillment.

Xing et al. (2010) tested an e-PDSQ, built on the framework proposed by Xing and Grant (2006), focusing on order fulfillment. They tested consumers' perception on two distinct levels, respectively: the importance of 15 internet retailing home delivery variables and the perception of an online retailer's delivery service. The study showed that, after timeliness of delivery and order accuracy, availability of order tracking is the most valuable variable to consumers who made an online purchase.

Liao et al. (2010) investigated the fulfillment stage of online purchase, and stated that customers' expectations during this stage include, along with other factors, effective order tracking.

Rao et. al (2011) showed the positive effect of Physical Distribution Service Quality (PDSQ) on customer satisfaction and retention. Among others, order tracking is one of the measures for PDSQ. The research demonstrated that the influence of PDSQ on Customer Purchase Satisfaction is significant, and that the former element is an antecedent of customer retention.

In a research by Cao and Zhao (2004), the presence of an order tracking tool usually boost better retailers evaluation.

The same authors show that low prices are not a driver for satisfaction with the order fulfillment process. Instead, the factors affecting satisfaction regarding order fulfillment process are, among others, on-time delivery and the efficiency and easiness in tracking the order (Cao and Zao, 2004).

When investigating the effect of order fulfillment quality on customers repurchase intentions, Cho (2014) included order tracking availability as one of the items needed to measure the "order fulfillment quality perception" variable. The factor analysis that was conducted with the objective of assessing which items belonged to the variable, found order tracking as a significant item. However, order tracking has never been analyzed as a single factor that influences customers' perception.

Order tracking is then a fundamental influencing element of consumers' e-shopping. Nguyen et al. (2018) list it as an "order-fulfillment element relevant to online consumer behavior". Similarly, Al-Adwan et al. (2022), researched the influencing forces of repurchase and WOM intention in the e-shopping context, finding that offering a tracking system which updates itself in real time is extremely relevant to increase customer satisfaction.

Nguyen et al. (2019) performed a conjoint analysis in order to find out which are the elements that consumers value the most, when choosing between the delivery options made available by e-commerce retailers. They found that there is a segment of consumers who prioritize time and convenience, thus giving high importance to factors such delivery speed and delivery information, which include the availability of tracking and tracing the order.

In recent research, Mofokeng, T. E. (2023) showed that on-time delivery has a significant effect on consumer loyalty and consumer trust, therefore retailers should focus on improving their practices by providing real time delivery information.

As shown, previous research on order fulfillment quality and customer satisfaction with the order fulfillment process in e-shopping recognizes the importance of order tracking.

All e-commerce should provide their customers with an order tracking and tracing tool, among other elements. The aim of this paper is to study order tracking as a singular force, isolated from the factors within it has been measured until now, and its impact on customer satisfaction with online purchase.

2.5 Proactive Notifications

2.5.1 Use of technology

Customers' expectations about e-service quality have changed over time. Authors have made changes to the way we measure and conceptualize e-SQ and have placed more attention on e-LSQ.

Scholars claim that customers' expectations will continue to transform, often in conjunction with technological progress (Thirumalai et al. 2006). Therefore, academics need to recognize and investigate these transformations (Blut et al. 2015).

Simultaneously, businesses should think about how technology may help them create efficient and high level order fulfillment operations. Effective order fulfillment depends on managing consumer expectations, and according to Orenstein (1999, p. 1), "providing realistic delivery information is a key component to keeping buyers happy, even if merchandise won't arrive right away."

Through current digital and Internet technologies, e-retailers have the ability to give customers accurate delivery information and prompt assistance, allowing them to control customer expectations. Both e-retailers and e-shoppers contemplate the possibility of receiving value-added services, particularly order tracking and tracing, along with electronic delivery notifications. This could be made by combining technologies like e-mail and SMS. (European Commission, 2012; Okholm et al., 2013).

Nowadays, omni-channel strategy is extremely popular among retailers (Lee et al., 2019).

Murflield et al. (2017) have studied the role of logistics service quality in the omni-channel environment, finding that timeliness is the most impacting factor on customers' satisfaction and loyalty. In order to adapt supply chains to the new omni-channel context "systems will need to become more integrated across channels to provide better real-time supply and demand information".

Prassida et al. (2022) support the same concepts expressed by Murflied. In addition, they report that omni-channel businesses can optimize order fulfillment process in a cost-effective manner by implementing an integrated logistics system. Customers should be provided with automated notifications and real-time order tracking, in an integrated system.

Customers' behavior online is affected by the perception of the riskiness associated with their purchase (Javadi et al. 2012). In particular, risk of non-delivery was found to have a negative impact on customers' attitude towards e-shopping. Scholars have suggested improving retailers' communication towards customers to avoid this unfolding.

Therefore, based on the considerations described above, e-retailers could enhance customer satisfaction by using current technology.

2.5.2 Quantity of information

Previous research (Liang T., 1998) has shown that the uncertainty dimension has a negative impact on consumers, when buying online. Furthermore, trust and perceived risk have been proven to negatively affect consumers' purchase intentions towards an e-retailer (Chang et al., 2008). Specifically, the level and accuracy of provided information on a retailer's website was found to

significantly influence consumers' perceived risk. Research has shown that ordering and fulfillment are two separate steps of the online purchase process, as shown in the paragraph above. We propose that, as for the ordering stage, providing a large quantity of information during the fulfillment stage of an online purchase, has a positive effect on customers' satisfaction.

Customer satisfaction with online shopping experience grows when information about the carrier is disclosed on the website (Esper et al., 2003). We believe that the same effect occurs when information about the status of delivery, which is the following step faced by customers, is provided.

(Duarte et al., 2018) have shown that customers' satisfaction in the online context is affected by a dimension called search convenience, which represents the level to which retailers make it easy for customers to access detailed information about the products. This relationship has only been tested regarding the pre-purchase stage of online shopping experience.

Ma S. (2017) investigated one underlying dimension of e-LSQ and its impact on customers' satisfaction and re-purchase intention: delivery time. A long delivery time is an influential component that causes customers to perceive risk and uncertainty. Perceived riskiness and uncertainty have a significant negative effect on both, customer satisfaction and re-purchase intention. The author suggests, in particular, that the lack of information regarding delivery is the factor that majorly affects customers' perceptions in a negative manner.

It is proposed that, by raising the entity of communications towards clients, their satisfaction grows. Communications should inform customers about the whereabouts of their order. The aim of this paper is, therefore, to demonstrate that, when customers receive numerous delivery status updates, the level of satisfaction will be higher. We believe that retailers should send proactive notifications to their customers from the moment right after order placement, to the delivery. Proactive notifications on status delivery are to be intended as notifications that the customer did not specifically request, and that are not found by consulting an online tracking tool.

H1: Proactive notifications regarding the status of a delivery have a positive impact on order fulfillment customer satisfaction.

2.6 Product type

Previous academic research has focused on studying the effects of different product types on customer satisfaction with the order fulfillment process in the context of e-retailing. (Thirumalai et al. 2006) (Cho, 2015). Ma S. (2017) has demonstrated that customers are more satisfied when getting a faster delivery, if the purchase they made is important.

This research stream has the aim of innovating retailers' supply chains and fulfillment processes, by adapting them to the product that has to be delivered.

One of the most used theories in marketing research to distinguish products with different characteristics and behavioral responses is the product classification scheme (Copeland 1924), which identifies three categories of products: convenience goods, shopping goods and specialty goods. Convenience goods are low price products that consumers buy repeatedly, without putting much effort or thought into the purchase (gum, toilet paper, soap..); Shopping goods are products shoppers typically spend more time researching and comparing before they buy since they are less frequently purchased and have a higher price than convenience goods, although are still affordable (clothing items, small home decor..); Specialty goods, finally, are high-end branded products, rarely purchased, with a significant economic impact and unique features, considered to be superior to other brands' products (iPhones, luxury cars, gourmet food..)

Thirumalai et al. (2006) have demonstrated that the purchased product type has a negative impact on customer satisfaction with order fulfillment, since it decreases moving from convenience goods to specialty goods. In particular, customer expectations when buying specialty goods are higher than the same expectations when purchasing other kinds of goods. The authors have suggested investigating how technology advances can allow e-retailers to take into account different customers' expectations, according to the category of their purchase.

Cho (2015) decided to further study the impact of product type on the relationship between fulfillment quality and customer behavioral intention. In this case, drawing on the theory of Nelson (1970), he differentiates products between: (i) search products and (ii) experience products, nn the basis of an analysis of the perceived costs of information asymmetry (Stigler, 1961). Search products are a kind of goods "whose quality information is worth searching for prior to a purchase, because a marginal return for information searching is higher than the cost involved." Experience products, on the other hand, "do not reward information searching as search products do, because consumption or experience with the products is the only way to evaluate their quality."

The author found that differences in product type cause a modification of the path that conducts to repurchase intention. Therefore, e-retailers face distinct challenges according to the product they are selling, and their processes should be adapted.

Blut et al. (2015) originated a framework for measuring overall e-service quality, in relation to contextual and cultural aspects. They found that expectations regarding online service quality are different across countries and sectors (i.e., banking sector and online retailing). They suggest that research should further analyze how service quality is perceived in relation to other elements like high/low involvement products.

When customers are waiting for an important purchase, the perceived uncertainty and riskiness, due to lack of information, are higher than when they are waiting for a non-important purchase (Ma 2017). Based on the literature analyzed above, we propose that the use of proactive notifications has a stronger impact on satisfaction of those customers who purchased a product belonging to the specialty good category.

H2: Product type acts as a moderator in the relationship between proactive notifications and customer satisfaction.

2.7 Familiarity with online shopping

Familiarity, in this study, is to be intended as the level of comprehension and expertise about online shopping procedures.

Chiu (2012) reports that, in the context of online shopping, a customer who reaches a high level of experience using a retailer's website, will automatically connect his/her behavior on the website to a satisfactory transaction.

Furthermore, when customers are highly familiar with the processes that characterize online shopping, they are incentivized to perceive the online shopping environment as a stable context to operate. (Wood et al., 2012)

Therefore, familiarity with online shopping may have an influence on customers and their perceptions of an online purchase experience.

Familiarity with online shopping was thus included in the model as a covariate variable in order to control its effects.

2.8 Proposed conceptual framework

This study proposes the model shown in Fig. 1 to investigate the role of proactive notifications regarding the delivery status of an order to enhance their delivery service through the use of technology and to intensify the quantity of delivery information available to customers. Proactive notifications are to be intended as messages sent by the e-retailer to the customer, from the moment the former has placed the order to the moment the order is delivered, regarding the status and the location of the order. Notifications are defined as "proactive" due to their specific characteristics:

1. customers do not make any kind of request to the e-retailer in order to receive them.
2. customers do not need to consult an order tracking webpage to receive this kind of updates.

It is believed that proactive notifications have a positive effect on customer satisfaction.

The relationship between proactive notifications and customer satisfaction is predicted to be moderated by product type. The product classification used is the traditional product classification scheme, devised by Copeland (1924). In this paper, only two out of the three available types of products are considered: convenience and specialty goods. It is foreseen that proactive notifications have a stronger positive effect on the customer satisfaction, when the purchase made by the customers concerns a specialty good instead of a convenience good.
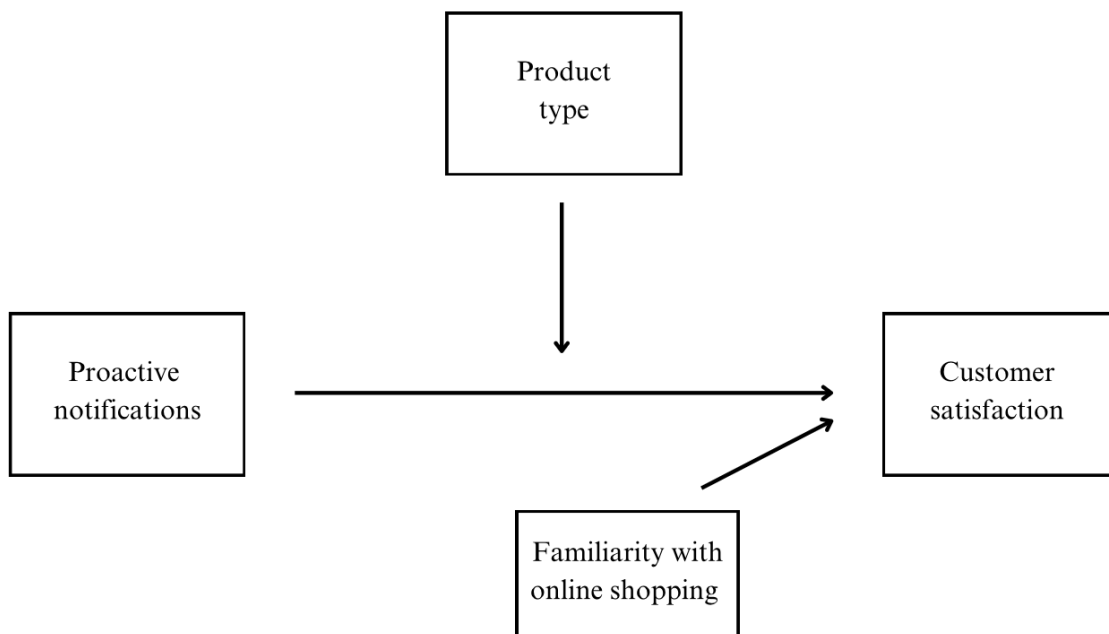
Figure 2.1 Conceptual model

CHAPTER 3 RESEARCH METHODOLOGY AND ANALYSIS OF RESULTS

3.1 Study overview

The aim of the study was to test whether the presence (vs. absence) of *proactive notifications* regarding the delivery status of an order has a positive effect on *customer satisfaction*. Furthermore, it is predicted that the kind of purchase, particularly the product type, has a moderation effect on the relationship between the presence of notifications and customer satisfaction. *Familiarity with online shopping* was included in the model as a covariate.

To actually conduct the study, a 2 (proactive notifications: presence vs. absence) x2 (product type: specialty vs. convenience good) in between-subjects experimental design was used.

Stimuli were built on the basis of the pre-tests conducted before. (*Appendix A, B)*

The online platform XM-QUALTRICS was used to structure and distribute an online questionnaire. The first two pages of the survey were used to inform respondents about the scope of the questionnaire, the anonymity of the responses and the safe use of data that was going to be made.

Respondents were asked to imagine having placed an online purchase having received it. Afterwards, they were randomly shown one out of the four possible experimental conditions: every respondent saw two images, one representing a product (either a laptop or a washing machine detergent) and one representing the notifications received before the delivery of the purchase (notifications or predicted delivery time). (*Appendix C)*

3.2 Pretests

Pre-tests were conducted to verify the correct perception of the stimuli by the respondents.

3.2.1 Proactive notifications

In order to test if the stimuli regarding proactive notifications were correctly perceived, an independent sample t test was conducted.

55 respondents (30 females, M_{age} = 24.2; SD = .5) were asked to imagine having placed an order on an e-shopping website, and that the order had been received. Subsequently, they were shown one of two pictures (*Appendix A).*

In both pictures, the screen of a smartphone was represented, which showed either:

1. in order to represent the absence of proactive notifications, only the phrase "Your order will be delivered in 3-5 days" appeared on the screen.

2. Instead, to show the presence of notifications, the phone showed a list of delivery movements and positions.

A 7-points likert scale was created to measure the perception of notifications. The scale included three items:

"The e-retailer sent me updates about the delivery status of my order".

"Without requesting it, I received multiple updates about the delivery status of my order".

"I did not ask for information about the delivery status of my order, but I received some anyways".

Factor analysis and scale reliability were conducted.

The correlation matrix showed that all the items had a correlation above .5, therefore I proceeded with factor analysis.

The KMO measure of sampling adequacy was .623 and Bartlett's test of sphericity was significant ($\chi2 = 91.835$ df $= 3$, $p < .001$).

Only one factor with an Eigenvalue above 2 was identified and it explained 78.3% of the total variance, which exceeds abundantly the 60% threshold usually accepted. The scree plot indicates an elbow curve after one, therefore we can conclude that only one factor was identified.

The Cronbach's Alpha identified through reliability analysis was .86, which is acceptable.

Having checked all the requirements and assumptions, it was possible to move on to the independent sample t test.

Ultimately, the stimulus was found to be successful: the mean for presence of proactive notifications ($M_{notifications} = 4.1$; SD $= 1.12$) was significantly different from the mean for absence of notifications ($M_{no\_notifications} = 2.48$; SD $= 1.22$).

Results and stimuli of the pre-test are represented in *Appendix A*.

3.2.2 Product type

A pretest was conducted also on the stimuli regarding different product types, in order to verify that consumers were perceiving them correctly.

Analogously to the process used assess the validity of the stimuli concerning proactive notifications, in order to test the moderation effect of different product types on the relationship between proactive notifications and customer satisfaction, two stimuli were created (convenience good vs. specialty good). (*Appendix B)*

Respondents were recruited through the convenience sample method and were asked to complete an online questionnaire.

To represent the purchase of a convenience good, the image of a no-brand laundry soap was presented.

Other products were taken into consideration to represent a convenience good, specifically coffee or tea packs. However, since the survey was going to be forwarded mostly to Italian respondents, cultural aspects may have affected the perception of the product.

The specialty good stimulus was created using the image of a laptop. In this case, although any technology product may have been equally adequate to the scope, for instance a TV, the questionnaire was going to be forwarded to a large number of students and newly-workers, who more probably already have experienced the purchase of a laptop instead of a TV. As well as for the convenience good stimulus, the laptop's brand was not highlighted.

Initial responses were 59; however, only 52 have completed the survey and were therefore retained. Final sample therefore included 52 responses.

Among the respondents, 29 were females (55.8%), 20 were males (38.5%) and two indicated to be non-binary or third gender (3.8%). The age range went from 22 years old to 64 (M_{age} = 28.00; SD = 11.24).

Respondents were shown randomly one of the two stimuli (convenience good vs. specialty good) and asked to rate the product on a 5- point Likert scale (1 = Strongly disagree, 5 = Strongly agree), that included 3 items:

"The product displayed is something I purchase frequently."

"I would spend a considerable amount of time evaluating the purchase of the product displayed."

"Purchasing the product displayed would require a considerable amount of money."

The scale was created by reporting the elements that characterize and differentiate convenience goods from specialty goods.

Since the scale used was not pre validated, it was necessary to assess its validity.

Factor analysis and reliability analysis were conducted.

Firstly, the answers to the first item were reversed in order to conduct the analysis.

Correlation matrix showed that all correlations were above 0.30, therefore it was possible to proceed with FA.

The KMO measure of sampling adequacy was .639 and Bartlett's test of sphericity was significant ($\chi2$ = 83.197 df = 3, p < .001).

Through Factor Analysis, only 1 factor with an eigenvalue larger than 1 was found (Eigenvalue = 2.35); the cumulative variance explained was 78.27% which is acceptable since it is higher than 60%. The scree plot showed that the elbow point could be identified on 2, therefore only one factor was retained.

Reliability analysis was completely acceptable (α = .854).

Results from one independent sample t-test showed that the stimulus was effective, as convenience good ($M_{convenience}$ = 1.99; SD = .90) received lower evaluations than specialty good ($M_{specialty}$ = 4.44; SD = .74) and the test was significant (t (50) = 10.787, p < .001)

3.3 Main study

The main study was aimed at testing the hypothesis listed in the literature:

H1: Proactive notifications regarding the status of a delivery have a positive impact on order fulfillment customer satisfaction.

H2: Product type acts as a moderator in the relationship between proactive notifications and customer satisfaction.

    H2a: Product type has a positive effect on customer satisfaction.

    H2b: There is a significant interaction effect between proactive notifications and product type.

3.3.1 Participants

Convenience sampling method was used to recruit participants (N=195). However, only 145 responses were considered valid and therefore retained. Respondents were asked to complete an online survey through different online platforms (among the others, Facebook, Instagram and Whatsapp), as well as through an in-person distribution. The sample included 73 females (49%), 72 males (50%) and 2 non-binary or third gender people (1.4%). (*Appendix D*)

The minimum age recorded was 19 and the maximum was 62 (M_{age} = 26.19; SD = 8.77). (*Appendix D)*

Participation in the study was completely volunteer, respondents were not offered any kind of reward.

3.3.2 Manipulation checks

Manipulation checks were included in the questionnaire and conducted using two 5-points differential semantic scales.

The scale regarding presence vs. absence of notifications was anchored with 1 as "The first image showed more than 3 delivery status updates" and 5 as "The first image showed only a non-specific predicted delivery date". The manipulation check for presence of notifications was successful as the mean for presence of notifications was statistically different than the one without notifications

($M_{notifications}$ = 1.38, SD = .983   vs. $M_{no\_notifications}$ = 4.10, SD = 1.49;   t(153)   =   -13,414,   p < .001). (*Appendix E)*

The differential semantic scale used to conduct manipulation check for product type asked respondents which product they had seen in the first image and was anchored with 1 as "washing machine detergent" and 5 as "laptop". As well as for the first manipulation check, the means for the two images were found to be statistically different (Laptop = 4.67, SD = 1.02   vs. $M_{detergent}$ = 1.02, SD = .149;   t (166) = 33.3, p <. 001) therefore manipulations were considered to be successful.

3.3.3 Confirmatory Factor Analysis and Reliability checks

After the manipulation checks, respondents were asked to rate their customer satisfaction. It was used a 7-point likert scale slightly adapted from Blut (2016), which asked respondents how much they agreed with the following three statements:

"I am satisfied with this online retailer",

"The online retailer is close to being an ideal online retailer" and

"The online retailer meets my needs".

As well as customer satisfaction, familiarity with online shopping, which was included in the model as a covariate was measured using a pre-validated scale, adapted from (Chiu, 2012). The scale asked respondents how much they agreed with three following statements:

- "I am familiar with searching for products online"
- "I am familiar with buying products online"
- "I am familiar with the process of purchasing products online"

The scale was tested through factor analysis and reliability analysis, which both produced satisfying results. In particular, KMO measure for sampling adequacy was acceptable (α = .756). (*Appendix F).* Bartlett's test of sphericity was significant ($\chi2$ = 789.160, df = 15, p < .001).

Two factors were found Eigenvalues larger than one, supporting the scale aim of measuring two variables: satisfaction and familiarity. The scree plot originated an elbow curve on 3. The cumulative percentage variance explained by the two factors was 90%, therefore largely acceptable.

Lastly, a scale reliability check was conducted to assess the reliability of the multi-item scale. Cronbach's Alpha was found to be larger than .5, therefore acceptable (α = .767). (*Appendix G)*

Ultimately, the analysis conducted on the scale provided results that allowed the following analysis.

3.3.4 Assumptions checks

To verify the hypothesis, a two-way ANOVA was conducted using the software IBM SPSS Statistics.

However, it is necessary to check for ANOVA assumptions to be met, before moving on to the analysis.

The first assumption concerns the independence of observations, which can be assumed thanks to the use of a between-subject design used.

Secondly, ANOVA requires for variances across different groups to be equal. To this purpose, Levene's Test of Equality of Error variances was conducted. Ultimately, the test exhibited heteroscedasticity (*Appendix H*).

However, according to Hair et al. (2014) "a violation of this assumption has minimal impact if the groups are of approximately equal size" (p. 685), which was the case in this dataset.

Lastly, Kolmogorov-Smirnov and Shapiro-Wilk tests were conducted in order to verify whether observations followed a normal distribution. Significant values were found for both groups of *proactive notifications,* where the group who saw the scenario with no notifications showed non-normality (D(72) = 1.33; p = .003), as well as the group that saw notifications (D(77) = .222;   p < .001). Regarding *product type,* the detergent group (D(82) = .133; p = .001) and the laptop one (D(67) = .168; p < .001) exhibited a violation of the normality assumption. (*Appendix I and J*)

However, the central limit theorem shows that for sample larger than thirty observations, data can be accurate even when the normal distribution assumption is not respected; thus, it was possible to proceed with the ANOVA analysis.

As specified above, the model also included a covariate, namely *familiarity with online shopping*. Results from the confirmatory factor analysis conducted to verify the validity and reliability of the scale that measured this variable have already been reported above.

To investigate the role of the covariate I used an ANCOVA analysis, which, as well as ANOVA, comes with its own assumptions.

The first assumption to conduct ANCOVA relies on the presence of a low correlation (<.80) between the dependent variable *customer satisfaction* and the covariate *familiarity*. The correlation found between the variables was valued at .025, validating the first assumption. (*Appendix K*)

Secondly, before conducting ANCOVA I verified that the dependent variable was normally distributed. Both Skeweness (-.482) and Kurtosis (-.826) for *customer satisfaction* showed values under 1, hence the second assumption was respected. (*Appendix L*)

Third, once again the Levene's Test of Equality of error was conducted with the objective of analysing the variances across groups. The test was significant, indicating different variances of errors across groups. (*Appendix M*) However, Levene's test is not always appropriate to justify the interruption of analysis, since variances inequality may not be large enough to cause problems. (Fields, 2013).

3.3.6 Results

The first hypothesis predicted a significant positive effect on *customer satisfaction* caused by the presence of *proactive notifications*. A two-way ANOVA was run on a sample of 149 observations to test H1.

From the analysis, it emerged that the customer satisfaction mean was higher when notifications were present ($M_{notifications}$ = 5.77; SD = 1.09) than when they were absent ($M_{no\_notifications}$ = 3.48; SD = 1.59). The presence of notifications positively and significantly affects customer satisfaction ($F(1,145)$ = 108.470; $p < .001$). Therefore, we can accept H1. (*Appendix N*)

Secondly, it was predicted that the positive effect of the presence of proactive notifications would be stronger on those customers who had purchased a specialty good.

Results showed that this effect was not present, since the difference between means ($M_{specialty\_good}$ = 4.61, SD = 1.92; vs. $M_{convenience\_good}$ = 4.70, SD = 1.65). was not significant ($F(1,45)$ = .80, $p = .778$). (*Appendix N*).

Accordingly, to the results originated from the two-way ANOVA, H2a must be rejected, since the product type did not significantly affect customer satisfaction.

Lastly, the object of this paper was to test if it existed an interaction effect between the variable *proactive notifications* (presence vs. absence) and *product type* (specialty good vs. convenience good).

Although the analysis showed a higher *customer satisfaction* for specialty goods when notifications are present ($M_{notifications\_spec}$ = 5.92; SD = 1.13 vs. $M_{notification\_conv}$ = 5.64; SD = 1.05) and a lower one when they are absent ($M_{no\_notifications\_spec}$ = 3.26; SD = 1.61 vs. $M_{no\_notifications\_conv}$ = 3.67; SD = 1.57), the interaction effect was found to be not significant ($F(1,145)$ = 2.35; $p = .128$).
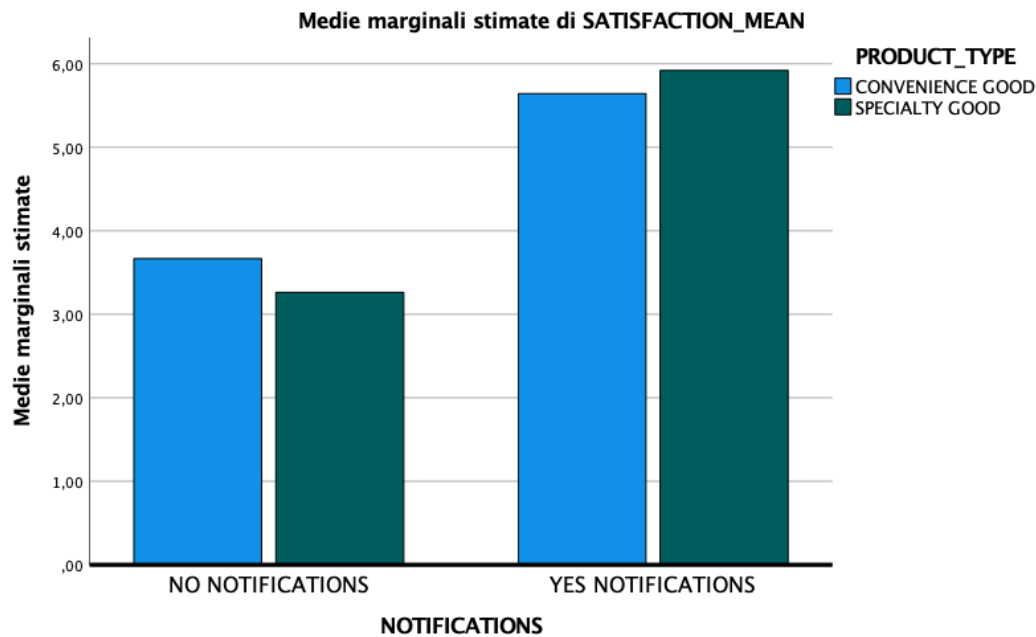
Figura 3.1 Graphical display of the interaction between the presence of notification and the type of product

It can be concluded that there is not a moderation effect caused by product type on the relationship between notifications and customer satisfaction is not present, therefore H2b must be rejected.

Lastly, an ANCOVA was ran in order to check the effect of the covariate *familiarity with online shopping* on the proposed model.

The effect of the covariate was found to be not significant ($F(1,138) = .543$; $p = .462$). (*Appendix O*)

3.4 Results, discussion and conclusion

The main objective of this study was to analyze the role of proactive notifications in the context of online shopping and revealing its influence on electronic logistics service quality. The research question from which this research arose was the following:

How can order fulfillment be improved through the use of technology, in order to impact customer satisfaction?

The study focuses on the use of proactive notifications as an instrument through which e-retailer can enhance their order fulfillment process, which is the process that takes place from the moment a customer makes a purchase on a e-retailer website, to the moment he/she receives it.

Proactive notifications are alerts sent by an e-retailer to the customer who has placed an online order, in absence of a specific request made by the customer to receive these alerts. The concept of proactive

notifications differs from the one of an order tracking webpages, since the latter implies an action taken by the customer in order to visit said page, while the former does not require any kind of effort. It was hypothesized that the use of proactive notifications would enhance customer satisfaction with the order fulfillment process provided by an e-retailer.

This hypothesis was verified, as *customer satisfaction* was found to be higher when proactive notifications were present.

The second hypothesis concerned the presence of a moderation variable between the presence of notifications and customer satisfaction: product type. In this paper, products are differentiated on the basis of the traditional product classification scheme proposed by Copeland (1924). Two products were shown to participants: a laptop, to represent a specialty good, and a washing machine detergent to represent a convenience good.

Results revealed the absence of an interaction effect between the independent variable and the moderator; therefore, it can be concluded that product type does not act as a moderator of the relationship presented.

Customers desire to be actively informed about the status of their purchases, regardless of the importance of the product they are awaiting.

The reason to the absence of moderation may rely on two main elements, one related to the characteristics of the sample and one concerning the general approach to information that has been taking place in the last decades.

Firstly, the sample analyzed included mainly Italian people of a young age (around 24). Young people are mostly used to making online purchases. Consequently, it is probable that a part of the respondents has witnessed the proactive notification approach while waiting for a purchase. Having experienced the reception of proactive notifications regarding the status of a delivery would modify expectations, making the non-reception almost unacceptable, regardless of the product purchased.

Secondly, Italians are listed as high on Hofstede's uncertainty avoidance dimension (De Mooij & Hofstede, 2010). This indicates that Italians are not comfortable with the absence of clear and specific information, especially regarding events that will take place in the future.

Lastly, nowadays, consumers expect real-time and precise information regarding most of their daily activities, for instance, people who take public transportation are used to knowing exactly how many minutes they will have to wait (Lu et al., 2018). This availability of information does not only concern things with which people come into direct contact, but it applies also to local and world news (Sakaki, 2010) and to what their friends and colleagues are doing and where they are, almost at any given moment. (Roy, J., 2023). As a consequence, the expectation of receiving instantaneous information regarding a purchase is probably going to persist, in spite of the importance of their purchase.

Finally, considering that consumers who are highly familiar with online shopping procedures are more inclined to believe to be operating in a stable context, when purchasing from e-retailers' websites (Wood, 2002), *Familiarity with online shopping* was included as a covariate. Ultimately, the variable was found to not have a significant influence on the model.

3.4.1 Research limitations

It is common for empirical studies to carry limitations, as this one does.

Firstly, analysis revealed the presence of heteroskedasticity throughs significant Levene's tests for equality of variances. However, this occurrence did not prevent the analysis from progressing, since "a violation of this assumption has minimal impact if the groups are of approximately equal size" (Hair et. al, 2014).

Secondly, observations for both the independent and the moderation variable were not normally distributed. In some cases, this can alter the results obtained by the ANOVA analysis. However, as specified above, the central limit theorem states that, as t the pool of observations grows (at least thirty observations) the normal distribution of the sample can be assumed.

Thirdly, this study is limited by the choice of sampling method. The use of convenience sampling is not advised in quantitative research, as it may lead to biases like under coverage bias, which prevents the sample form including important responses, and observers bias, which influences research into picking respondents according to his/her own subjective judgment.

In addition to the limitations already listed, it must be specified that the study was conducted on the results of a questionnaire that simulated an online shopping experience. Respondents, in fact, did not concretely place an online order; instead, they were only asked to imagine having made a purchase on a website. Therefore, the purchase process analyzed may have been perceived as different than an actual e-shopping experience.

Lastly, most of the participants to the study were Italian people of relatively young age (around 20), mostly attending university or having already obtained a university degree. Therefore, the generalization of the results is limited.

3.4.2 Theoretical implications

This research represents a contribution to previous academic studies that focused on customers' evaluations of electronic logistics service quality, by examining the effects of proactive notifications on customer satisfaction, which have been overlooked by previous research.

The current paper opens the gateway to a new stream of research regarding the use of proactive notifications to enhance the order fulfillment process in the context of online retailing.

Given the significant results of the presence of proactive notifications on customer satisfaction, proactive notifications can be interpreted as a technological tool that improves customers feelings and perceptions of e-retailers.

This research demonstrated the presence of a positive effect on customer satisfaction, driven by proactive notifications. Until now, existing models aimed at measuring online logistics service quality have not included this variable in the order fulfillment dimension. (Blut, 2016; Xing et al., 2010; Rao et al., 2011). Scholars should be aware that new models for measuring e-lsq perceptions should be developed, in order to include notifications about delivery status as one of the impacting variables.

3.4.3 Managerial implications

Findings from this research indicate that consumers, when purchasing from online retailers, aspire to receive notifications regarding the state of the delivery of their orders.

These results should be taken into consideration by managers and firms in several ways, considering the potential competitive advantage to be gained.

Firstly, firms which are planning on opening an e-commerce website have the possibility of choosing what kind of delivery service to provide to their customers. While relying on an internal delivery service may provide numerous advantages, such as lower variable costs, companies must be aware of the necessity of implementing a notification system.

On the other hand, companies that do not have the possibility of developing this kind of service can decide to partner with a third party to handle their last mile logistics. In this case, the choice of a third party should be based, among the other elements that depend on specific situations and necessities, on the ability of the partner to provide a notification system to customers.

Secondly, firms that already have an e-commerce should evaluate to invest in an enhancement of their delivery processes, in order to incorporate the ability of sending proactive notifications to their customers.

By using proactive notifications, firms can reduce the amount of complains and questioning by customers regarding the status of their delivery. Consequently, customer support services can reduce the time and effort spent on handling requests and providing help, leading firms to lowering their costs. Therefore, implementing a proactive notification system would not only improve customer satisfaction but also the quality of customer support provided.

Lastly, results from the analysis displayed that the type of good ordered by customers, either specialty or convenience, does not affect customers preference for receiving notifications. Thus, firms can

implement a notifications service for every order received on their website, regardless of the kind of product they are shipping.

3.4.4 Directions for future research

This study was conducted by including the product type as a moderator between the presence of proactive notifications regarding the delivery status of an order, and customer satisfaction. Although it was an interesting element to investigate, there are other elements that can cause an influence between notifications and customer satisfaction in the online environment.

Perceived risk has been shown to have an effect on customer satisfaction when purchasing online (Chang et al., 2008). As was stated in the chapters regarding the academic literature on which this paper is based, customers perceive risk when e-shopping due to lack of information (Ma S., 2017), therefore perceived risk could be included in the studied model. Specifically, the effect of proactive notification on perceived risk should be examined. It is possible that, by implementing the use of notifications, customers would perceive a lower risk, therefore perceive risk could be studied as a mediator variable in the model.

This paper was aimed at investigating the effect of two variables of customer satisfaction. However, literature has often focused on studying the influence electronic logistics service quality on customers' behavior, specifically on re-purchase intention. (Duarte et al., 2018; Adwan et al., 2022; Jain et al., 2021) Future research should examine the same model that was analyzed in this paper, introducing re-purchase intention and other behavioral variables, for instance Net Promoter Score or Word of Mouth, as dependent variables.

In the presented model, one reason that justifies the absence of a moderation relationship represented by different product types, is the availability of instantaneous information regarding essentially every aspect of everyday life that characterizes the current era. The internet has become *embedded*, *embodied* and a pervasive instrument in our everyday life (Hine, 2015)

Future research should investigate the role of consumers' habits and perceptions concerning the constant flow and storage of real-time information in the context of online delivery.

This model tested the effect of proactive notifications, without specifying how exactly the notifications were sent to the customers. The combination of technologies like e-mail and SMS provides value-added services to both e-consumers and e-retailers. (European Commission, 2012). Nowadays e-retailers can take advantage of the large number of possible ways to contact customers: they can create their own apps, use email accounts, SMS, or even social networks if the purchase was made through a social platform. Thus, as the effect of notifications on customer satisfaction was

significant and positive, scholars should deepen their knowledge of which is the most effective and rewarding channel to use in order to deliver the notifications.

Lastly, this study was influenced by the characteristics of the sample analyzed. Respondents were mainly young people from Italy, attending university. The narrow age and geographical origin ranges may have reduced the generalizability of the results.

In the future, academics could test the proposed model by broadening the pool of observations.

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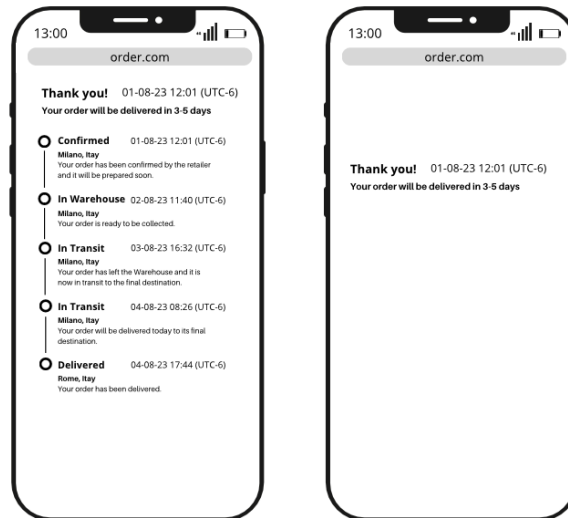
Test di KMO e Bartlett

Misura di Kaiser-Meyer-Olkin di adeguatezza del campionamento.		,623
Test della sfericità di Bartlett	Appross. Chi-quadrato	91,835
	gl	3
	Sign.	<,001

Varianza totale spiegata

Componente	Autovalori iniziali			Caricamenti somme dei quadrati di estrazione		
	Totale	% di varianza	% cumulativa	Totale	% di varianza	% cumulativa
1	2,349	78,299	78,299	2,349	78,299	78,299
2	,492	16,411	94,710			
3	,159	5,290	100,000			

Metodo di estrazione: Analisi dei componenti principali.
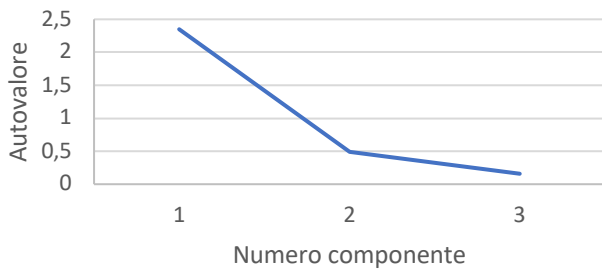
Grafico scree

Statistiche di affidabilità

Alpha di Cronbach	Alpha di Cronbach basata su elementi standardizzati	N. di elementi
,861	,860	3

Statistiche gruppo

	SCENARIO	N	Media	Deviazione std.	Errore standard della media
MEANIV	1,00	30	4,1000	1,12495	,20539
	,00	27	2,4815	1,22416	,23559

Test campioni indipendenti

		Test di Levene per l'eguaglianza delle varianze		Test t per l'eguaglianza delle medie						
						Significatività				Intervallo di confidenza della differenza di 95%
		F	Sign.	t	gl	P unilaterale	P bilaterale	Differenza della media	Differenza errore std.	Inferiore	Superiore
MEANIV	Varianze uguali presunte	,894	,348	5,202	55	<,001	<,001	1,61852	,31114	,99498	2,24206
	Varianze uguali non presunte			5,178	53,061	<,001	<,001	1,61852	,31255	,99164	2,24540

Appendix A – Pre-test notifications: stimuli and results

Statistiche gruppo

	SCENARIO	N	Media	Deviazione std.	Errore standard della media
MEAN	1,00	28	4,4405	,73733	,13934
	,00	24	1,9861	,90345	,18442

Test di KMO e Bartlett

Misura di Kaiser-Meyer-Olkin di adeguatezza del campionamento.		,639
Test della sfericità di Bartlett	Appross. Chi-quadrato	83,197
	gl	3
	Sign.	<,001

Varianza totale spiegata

Componente	Autovalori iniziali			Caricamenti somme dei quadrati di estrazione		
	Totale	% di varianza	% cumulativa	Totale	% di varianza	% cumulativa
1	2,348	78,266	78,266	2,348	78,266	78,266
2	,493	16,431	94,697			
3	,159	5,303	100,000			

Metodo di estrazione: Analisi dei componenti principali.
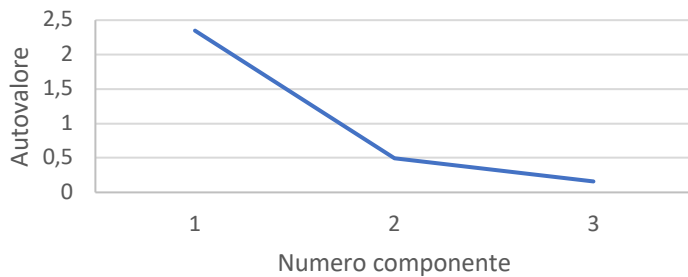
Statistiche di affidabilità

Alpha di Cronbach	Alpha di Cronbach basata su elementi standardizzati	N. di elementi
,854	,859	3

Test campioni indipendenti

		Test di Levene per l'eguaglianza delle varianze		Test t per l'eguaglianza delle medie						Intervallo di confidenza della differenza di 95%	
		F	Sign.	t	gl	Significatività P unilaterale	P bilaterale	Differenza della media	Differenza errore std.	Inferiore	Superiore
MEAN	Varianze uguali presunte	2,047	,159	10,787	50	<,001	<,001	2,45437	,22753	1,99735	2,91138
	Varianze uguali non presunte			10,619	44,424	<,001	<,001	2,45437	,23114	1,98866	2,92007

Appendix B - pre-test product type: stimuli and results

Imagine that you have placed an order from an e-commerce and that it has been delivered. You did not select any particular option regarding the delivery of your order. The following images show:

1. The **product** that you ordered;

2. The **notifications** that were sent to you by the e-retailer, from the moment you placed the order to the moment it was delivered.

Imagine that you have placed an order from an e-commerce and that it has been delivered. You did not select any particular option regarding the delivery of your order. The following images show:

1. The **product** that you ordered;

2. The **notifications** that were sent to you by the e-retailer, from the moment you placed the order to the moment it was delivered.

Imagine that you have placed an order from an e-commerce and that it has been delivered. You did not select any particular option regarding the delivery of your order. The following images show:

1. The **product** that you ordered;

2. The **notifications** that were sent to you by the e-retailer, from the moment you placed the order to the moment it was delivered.

Imagine that you have placed an order from an e-commerce and that it has been delivered. You did not select any particular option regarding the delivery of your order. The following images show:
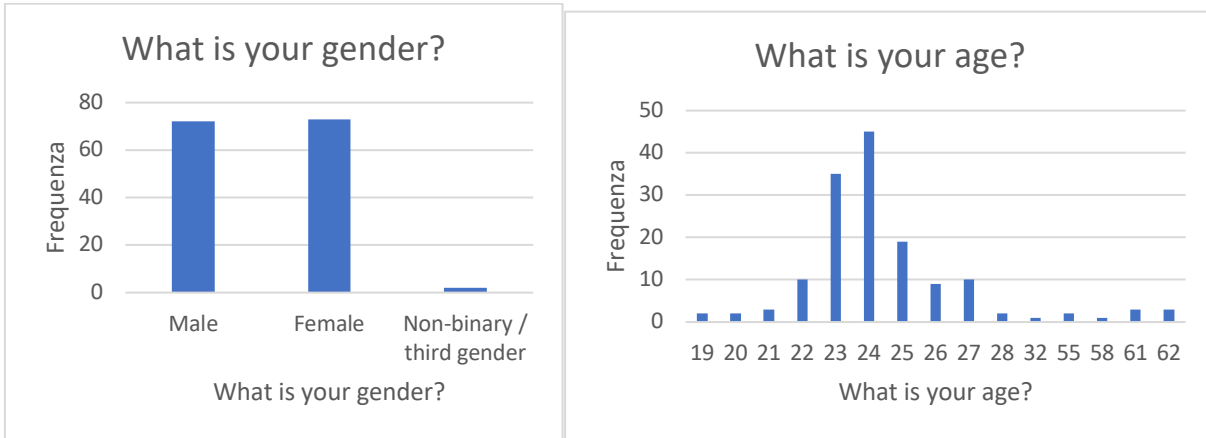
1. The **product** that you ordered;

2. The **notifications** that were sent to you by the e-retailer, from the moment you placed the order to the moment it was delivered.

Appendix C – Main study stimuli

What is your gender?

What is your age?

Appendix D – Sample descriptive statistics

MC_PN Which product did you see in the first image?

	1 (1)	2 (2)	3 (3)	4 (4)	5 (5)	
Washing machine detergent	◯	◯	◯	◯	◯	Laptop

Statistiche gruppo

	PRODUCT_TYPE	N	Media	Deviazione std.	Errore standard della media
Which product did you see in the first image? – Washing machine detergent:Laptop	1,00	79	4,67	1,022	,115
	,00	89	1,02	,149	,016

Test campioni indipendenti

		Test di Levene per l'eguaglianza delle varianze		Test t per l'eguaglianza delle medie						Intervallo di confidenza della differenza di 95%	
		F	Sign.	t	gl	Significatività P unilaterale	P bilaterale	Differenza della media	Differenza errore std.	Inferiore	Superiore
Which product did you see in the first image? – Washing machine detergent:Laptop	Varianze uguali presunte	35,857	<,001	33,299	166	<,001	<,001	3,648	,110	3,432	3,865
	Varianze uguali non presunte			31,439	80,949	<,001	<,001	3,648	,116	3,418	3,879

Appendix E – manipulation check proactive notifications

MC_PT The second image showed:

	1 (1)	2 (2)	3 (3)	4 (4)	5 (5)	
More than 3 delivery satus updates	○	○	○	○	○	Only a non-specific predicted delivery date

Statistiche gruppo

	NOTIFICATIONS	N	Media	Deviazione std.	Errore standard della media
The second image showed: – More than 3 delivery satus updates:	1,00	78	1,38	,983	,111
Only a non-specific predicted delivery date	,00	77	4,10	1,492	,170

Test campioni indipendenti

		Test di Levene per l'eguaglianza delle varianze		Test t per l'eguaglianza delle medie							
						Significatività		Differenza della media	Differenza errore std.	Intervallo di confidenza della differenza di 95%	
		F	Sign.	t	gl	P unilaterale	P bilaterale			Inferiore	Superiore
The second image showed: – More than 3 delivery satus updates: Only a non-specific predicted delivery date	Varianze uguali presunte	19,451	<,001	–13,414	153	<,001	<,001	–2,719	,203	–3,120	–2,319
	Varianze uguali non presunte			–13,380	131,326	<,001	<,001	–2,719	,203	–3,121	–2,317

Appendix F – manipulation checks product type

Matrice di correlazione

|		How much do you agree with the following statements? – I am satisfied with this online retailer.	How much do you agree with the following statements? – The online retailer is close to being an ideal online retailer.	How much do you agree with the following statements? – The online retailer meets my needs.	How much do you agree with the following statements? – I am familiar with searching for products online.	How much do you agree with the following statements? – I am familiar with buying products online.	How much do you agree with the following statements? – I am familiar with the process of purchasing products online.
Correlazione	How much do you agree with the following statements? – I am satisfied with this online retailer.	1,000	,837	,844	,048	,056	,047
	How much do you agree with the following statements? – The online retailer is close to being an ideal online retailer.	,837	1,000	,905	,022	,021	−,023
	How much do you agree with the following statements? – The online retailer meets my needs.	,844	,905	1,000	,014	,032	−,006
	How much do you agree with the following statements? – I am familiar with searching for products online.	,048	,022	,014	1,000	,826	,811
	How much do you agree with the following statements? – I am familiar with buying products online.	,056	,021	,032	,826	1,000	,873
	How much do you agree with the following statements? – I am familiar with the process of purchasing products online.	,047	−,023	−,006	,811	,873	1,000

Test di KMO e Bartlett

Misura di Kaiser–Meyer–Olkin di adeguatezza del campionamento.		,756
Test della sfericità di Bartlett	Appross. Chi–quadrato	789,160
	gl	15
	Sign.	<,001

Varianza totale spiegata

Componente	Autovalori iniziali			Caricamenti somme dei quadrati di estrazione			Caricamenti somme dei quadrati di rotazione		
	Totale	% di varianza	% cumulativa	Totale	% di varianza	% cumulativa	Totale	% di varianza	% cumulativa
1	2,774	46,227	46,227	2,774	46,227	46,227	2,725	45,418	45,418
2	2,626	43,771	89,998	2,626	43,771	89,998	2,675	44,580	89,998
3	,208	3,459	93,457						
4	,178	2,973	96,430						
5	,121	2,015	98,446						
6	,093	1,554	100,000						

Metodo di estrazione: Analisi dei componenti principali.
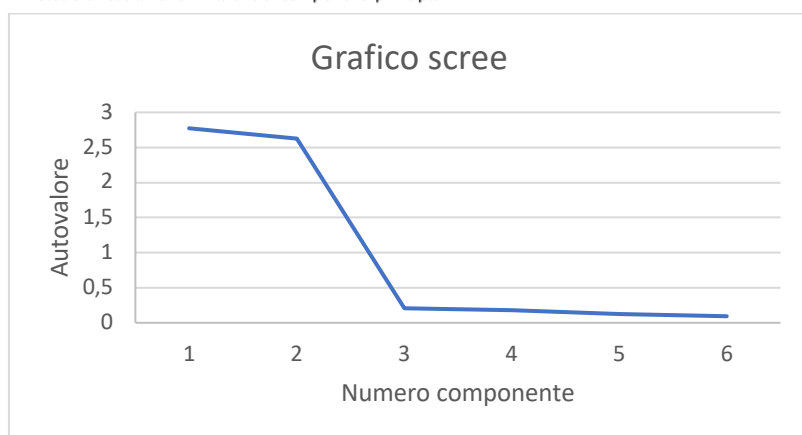
Grafico scree

Statistiche di affidabilità

Alpha di Cronbach	Alpha di Cronbach basata su elementi standardizzati	N. di elementi
,767	,767	6

Appendix G – CFA and reliability check

Test di Levene di eguaglianza delle varianze dell'errore[a,b]

		Statistica di Levene	gl1	gl2	Sig.
SATISFACTION_MEAN	Basato sulla media	6,478	3	145	<,001
	Basato sulla mediana	5,612	3	145	,001
	Basato sulla mediana e con il grado di libertà adattato	5,612	3	143,229	,001
	Basato sulla media ritagliata	6,645	3	145	<,001

Verifica l'ipotesi nulla che la varianza dell'errore della variabile dipendente sia uguale tra i gruppi.

a. Variabile dipendente: SATISFACTION_MEAN

b. Disegno: Intercetta + NOTIFICATIONS + PRODUCT_TYPE + NOTIFICATIONS * PRODUCT_TYPE

Appendix H – Levene's test for Equality of error variances

Test di normalità

	NOTIFICATIONS	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
		Statistica	gl	Sign.	Statistica	gl	Sign.
SATISFACTION_MEAN	,00	,133	72	,003	,955	72	,011
	1,00	,222	77	<,001	,890	77	<,001

a. Correzione di significatività di Lilliefors

Istogramma
per NOTIFICATIONS= ,00

Media = 3,48
Dev. standard = 1,588
N = 72
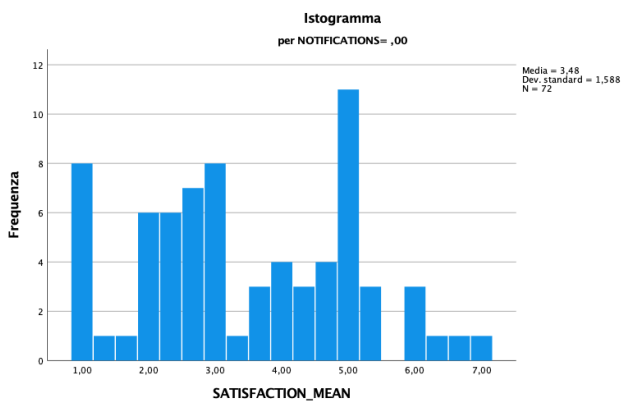
Appendix I - Kolmogorov-Smirnov and Shapiro-Wilk tests for notifications groups

Test di normalità

	PRODUCT_TYPE	Kolmogorov-Smirnov^a			Shapiro-Wilk		
		Statistica	gl	Sign.	Statistica	gl	Sign.
SATISFACTION_MEAN	,00	,133	82	,001	,936	82	<,001
	1,00	,168	67	<,001	,914	67	<,001

a. Correzione di significatività di Lilliefors

Istogramma

per PRODUCT_TYPE= 1,00

Media = 4,61
Dev. standard = 1,921
N = 67

Appendix J - Kolmogorov-Smirnov and Shapiro-Wilk tests for product type groups

Correlazioni

		SATISFACTION _MEAN	FAMILIARITY_ MEAN
SATISFACTION_MEAN	Correlazione di Pearson	1	,025
	Sign. (a due code)		,764
	N	149	143
FAMILIARITY_MEAN	Correlazione di Pearson	,025	1
	Sign. (a due code)	,764	
	N	143	143

Appendix K – correlation analysis between dependent variable and covariate

Statistiche descrittive

	N	Minimo	Massimo	Media	Deviazione std.	Asimmetria		Curtosi	
	Statistica	Statistica	Statistica	Statistica	Statistica	Statistica	Errore standard	Statistica	Errore standard
SATISFACTION_MEAN	149	1,00	7,00	4,6622	1,76893	-,482	,199	-,826	,395
Numero di casi validi (listwise)	149								

Appendix L – normal distribution of the dependent variable

Test di Levene di eguaglianza delle varianze dell'errore[a]

Variabile dipendente: SATISFACTION_MEAN

F	gl1	gl2	Sig.
7,137	3	139	<,001

Verifica l'ipotesi nulla che la varianza dell'errore della variabile dipendente sia uguale tra i gruppi.

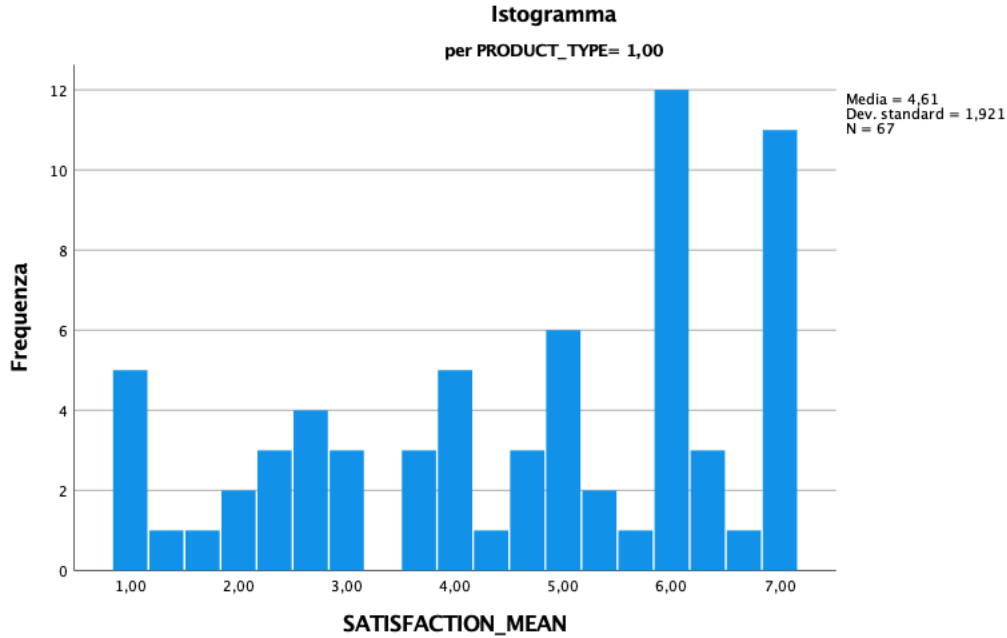a. Disegno: Intercetta + FAMILIARITY_MEAN + NOTIFICATIONS + PRODUCT_TYPE + NOTIFICATIONS * PRODUCT_TYPE

Appendix M – Levene's test

Statistiche descrittive

Variabile dipendente: SATISFACTION_MEAN

NOTIFICATIONS	PRODUCT_TYPE	Medio	Deviazione std.	N
,00	,00	3,6667	1,56534	39
	1,00	3,2626	1,61107	33
	Totale	3,4815	1,58819	72
1,00	,00	5,6434	1,05006	43
	1,00	5,9216	1,12833	34
	Totale	5,7662	1,08696	77
Totale	,00	4,7033	1,64555	82
	1,00	4,6119	1,92065	67
	Totale	4,6622	1,76893	149

Test di effetti tra soggetti

Variabile dipendente: SATISFACTION_MEAN

Origine	Somma dei quadrati di tipo III	df	Media quadratica	F	Sig.	Eta quadrato parziale	Parametro noncent.	Potenza osservata[b]
Modello corretto	198,617[a]	3	66,206	36,295	<,001	,429	108,886	1,000
Intercetta	3149,185	1	3149,185	1726,452	<,001	,923	1726,452	1,000
NOTIFICATIONS	197,857	1	197,857	108,470	<,001	,428	108,470	1,000
PRODUCT_TYPE	,146	1	,146	,080	,778	,001	,080	,059
NOTIFICATIONS * PRODUCT_TYPE	4,285	1	4,285	2,349	,128	,016	2,349	,331
Errore	264,491	145	1,824					
Totale	3701,778	149						
Totale corretto	463,108	148						

a. R-quadrato = ,429 (R-quadrato adattato = ,417)

b. Calcolato utilizzando alfa = ,05

Appendix N – descriptive statistics and in between subjects effects from two-way ANOVA

Test di effetti tra soggetti

Variabile dipendente: SATISFACTION_MEAN

Origine	Somma dei quadrati di tipo III	df	Media quadratica	F	Sig.	Eta quadrato parziale	Parametro noncent.	Potenza osservata[b]
Modello corretto	208,232[a]	4	52,058	30,093	<,001	,466	120,372	1,000
Intercetta	133,271	1	133,271	77,039	<,001	,358	77,039	1,000
FAMILIARITY_MEAN	,939	1	,939	,543	,462	,004	,543	,113
NOTIFICATIONS	207,159	1	207,159	119,752	<,001	,465	119,752	1,000
PRODUCT_TYPE	,192	1	,192	,111	,740	,001	,111	,063
NOTIFICATIONS * PRODUCT_TYPE	1,636	1	1,636	,945	,333	,007	,945	,162
Errore	238,727	138	1,730					
Totale	3517,778	143						
Totale corretto	446,959	142						

a. R–quadrato = ,466 (R–quadrato adattato = ,450)

b. Calcolato utilizzando alfa = ,05

Appendix O – ANCOVA between subjects effects test

SUMMARY

CHAPTER 1 LAST MILE DELIVERY

In the last decade, the enormous amount of people using the internet has contributed to an incredible growth of e-commerce sales and business.

Indeed, in 2021 almost 20% of all retail sales around the globe was made online. Compared to the year before, the number of online sales increased by 17.1%.

. In general, worldwide – even including under-developed countries - internet penetration rate is estimated at 64.6%which means there are 5.19 billion internet users.

Last mile delivery is the final step of the boundless and elaborate processes that constitute the supply chain, *"the final movement of goods from a business to its consumer"* (DHL 2022).

Although providing consumers with a satisfying delivery service has a number of positive effects on the provider, for instance high customer retention rates, increase of positive word of mouth and increment in consumers' willingness to pay (Capgemini Institute, 2019), consumers are not satisfied with delivery services.

Accenture (2022) identified the pillars on which retailers should base their actions, in order to provide consumers with a targeted delivery experience, namely:

- *Time of delivery*: consumers must be able to decide when their delivery should arrive.
- *Location*: companies and retailers must provide numerous delivery locations to consumers.
- *Order transparency:* consumers must be offered the possibility of being informed about every step of the delivery of their purchases
- *Sustainability:* consumers want to have the ability to choose among more sustainable delivery solutions
- *Customer Journey:* firms should focus on offering a smooth customer journey, from beginning to end.

From the companies' perspective, fulfillment and delivery represent high variable costs, which are extremely difficult to manage. Firms have started to look for creative solutions and developing new business models in order to be able to reduce the costs of last mile delivery, or even to make profit out of it. Amazon, for instance, has decided to use its network to provide such service to its competitors. Multi-Channel Fulfillment by Amazonf (MCF) is a subdivision of Amazon, which offers storage, packaging and delivery to e-sellers like Walmart, eBay, Etsy, Shopify and several others.

Besides representing a huge cost for firms, last mile delivery has an enormous environmental impact.

The World Economic Forum (2020) predicts a 36% increase in the number of vehicles on the road by 2030; as a consequence, the average commute could grow by 21% by the same year, uniquely due to last-mile delivery traffic.

To contrast this phenomenon, Accenture (2021) suggested to:

- *Incentivize greener choices*, by, for example, providing more sustainable delivery options to consumers;
- *rethink asset use:* Urban areas are full of assets that can put to use in new and more efficient manners;
- *Harness data and analytics* in order to reduce emissions of last mile delivery.

In 2020, due to the pandemic that spread around the world, the number of B2C deliveries grew by 25%, and the growth did not set back once the emergency ended. Covis-19 significantly affected the last mile delivery sector. Firstly, customers during the pandemic desired to receive contactless deliveries. As a consequence, firms increased their investments in autonomous vehicles. (Forbes, 2020). Secondly, although the phenomenon was already gaining firms attention and investments, Covid-19 promoted *decarbonization,* which is the development and the instatement of low or zero emissions vehicles, even more than before. During the pandemic, in order to provide a faster last mile delivery service to customers and to reduce carbon emission, firms began to operate using *local fulfillment* strategy: numerous micro-fulfillment centers were located on the territory, which allowed for deliveries to travel shorter distances to reach customers and to reduce emissions.

Numerous innovations, besides those related to Covid-19, have been introduced by firms to enhance last mile deliveries, for instance drones and crowdsourced deliveries.

CHAPTER 2 LITERATURE REVIEW AND DEVELOPMENT OF CONCEPTUAL FRAMEWORK

Customer satisfaction is "the customer's evaluation of a product or service in terms of whether that product or service has met the customer's need and expectations" (Zeithaml et al., 2009)

In the context of service quality, Parasuraman, A., Zeithaml, V. A., & Berry, L. L. (1994) have developed a model to measure service quality perception and customer satisfaction on the basis of the expectations disconfirmation paradigm. The model, called SERVQUAL, measures five different dimensions of service quality – namely: reliability, assurance, tangibles, empathy, responsiveness.

As e-commerce services became more and more in demand by customers, measures for service quality had to adapt to incorporate phases and processes related to the online shopping experience, which did not exist before.

In today's world, e-commerce and m-commerce (mobile commerce) have become extremely popular among consumers. Online shopping offers a higher level of convenience to consumers than an in store shopping experience (Jiang et al., 2013). One of the main elements that can enhance consumers' experience is the delivery service of their purchase. As will be shown, literature has shown that a firm's delivery service can impact consumers' behavioral intentions, in many different ways, from the initial purchase decision to positive WOM.

Since the growth of e-commerce services, the necessity of analyzing e-service quality and developing models to measure it has emerged.

Initial studies on the quality of e-services mostly examined how customers interacted with businesses' websites. (Loiacono et al., 2002), (Yoo, B., & Donthu, N. 2014)

Initial models developed to measure website quality in order to assess overall e-service quality perceived by customers failed to take into consideration numerous factors and variables that, as was later discovered, were fundamental to offer a satisfactory online shopping experience.

Collier J.E. and Bienstock C.C. (2006) overcame previous models, by developing a framework for evaluating the quality of e-services that took into account the effect of three dimensions: process quality, outcome quality, recovery; all three are influenced by various first-order dimensions.

Logistics Service Quality (LSQ) refers to the ability of logistics services to be aligned with or to surpass customers' expectations (Lin et al. 2023).

More recent literature has identified, besides website quality, physical distribution service quality (PDSQ) (Xing et al., 2010) and reverse logistics (Griffs et al., 2012) as factors contributing to e-retailing service quality. Scholars have deepened their knowledge of e-LSQ by not only developing models to measure it as a whole, but also by investigating the effects on customers of single aspects and dimensions that belong to the broader category.

Physical Distribution (PD) is typically seen as a component of an organization's outward logistics which deals with finished goods and represents a touchpoint between the organization and its clients; it's what is also called last mile delivery.

These aspects should be widely researched, as "order fulfillment is the essence of electronic Physical Distribution Service quality (e-PDSQ) in online retailing". Numerous authors have examined the role of order fulfillment and last mile delivery in B2C contexts.

Ordering and fulfillment have been identified as two distinct stages of the process that need to be examined individually by Liao et al. (2010) in their analysis of the antecedents of e-shopping behavior. Both stages affect customer satisfaction.

Rao et al. (2011b) stated that order fulfillment becomes a "key differentiator for online retailers who hope to generate customer loyalty". The researchers, studying the effect of order fulfillment glitches,

found that it is not enough to maximize efforts in order to avoid this kind of occurrences: it is necessary to reduce the impact of customers' anxiety regarding the delivery of a purchase, in order to preserve re-purchase intention.

Managers should strategize in order to ensure a high-quality fulfillment by enhancing the characteristics of this process, since order fulfillment has a significant influence on customers' repurchase intention. (Cho, 2015)

The role of order fulfillment and delivery quality of an online purchase has been examined also according to the entity of the e-retailer: market leaders and niche providers. Delivery aspects are found to be an element of focus for both kinds of providers, since they significantly affect customer satisfaction, which " ultimately contributes to higher customer loyalty and leads to recommendations, resales, and cross-selling effects" (Brusch et al., 2019).

This leads to the formulation of the following research question: *How can order fulfillment be improved through the use of technology, in order to impact customer satisfaction?*

Order tracking

Liao et al. (2010) investigated the fulfillment stage of online purchase, and stated that customers' expectations during this stage include, along with other factors, effective order tracking.

Rao et. al (2011) showed the positive effect of Physical Distribution Service Quality (PDSQ) on customer satisfaction and retention. Among others, order tracking is one of the measures for PDSQ. The research demonstrated that the influence of PDSQ on Customer Purchase Satisfaction is significant, and that the former element is an antecedent of customer retention.

In a research by Cao and Zhao (2004), the presence of an order tracking tool usually boost better retailers evaluation.

Proactive notifications

Customers' expectations about e-service quality have changed over time. Authors have made changes to the way we measure and conceptualize e-SQ and have placed more attention on e-LSQ.

Scholars claim that customers' expectations will continue to transform, often in conjunction with technological progress (Thirumalai et al. 2006). Therefore, academics need to recognize and investigate these transformations (Blut et al. 2015).

Online customer behavior is affected by the perception of the riskiness associated with their purchase (Javadi et al. 2012). In particular, risk of non-delivery was found to have a negative impact on

customers' attitude towards e-shopping. Scholars have suggested improving retailers' communication towards customers to avoid this unfolding.

Therefore, based on the considerations described above, e-retailers could enhance customer satisfaction by using current technology.

It is proposed that, by raising the entity of communications towards clients, their satisfaction grows. Communications should inform customers about the whereabouts of their order. The aim of this paper is, therefore, to demonstrate that, when customers receive numerous delivery status updates, the level of satisfaction will be higher.

Customer satisfaction with online shopping experience grows when information about the carrier is disclosed on the website (Esper et al., 2003). We believe that the same effect occurs when information about the status of delivery, which is the following step faced by customers, is provided.

(Duarte et al., 2018) have shown that customers' satisfaction in the online context is affected by a dimension called search convenience, which represents the level to which retailers make it easy for customers to access detailed information about the products. This relationship has only been tested regarding the pre-purchase stage of online shopping experience. I believe that retailers should send proactive notifications to their customers from the moment right after order placement, to the delivery of the order.

H1: Proactive notifications regarding the status of a delivery have a positive impact on order fulfillment customer satisfaction.

Product type

Previous academic research has focused on studying the effects of different product types on customer satisfaction with the order fulfillment process in the context of e-retailing. (Thirumalai et al. 2006) (Cho, 2015). Ma S. (2017) has demonstrated that customers are more satisfied when getting a faster delivery, if the purchase they made is important.

One of the most used theories in marketing research to distinguish products with different characteristics and behavioral responses is the product classification scheme (Copeland 1924), which identifies three categories of products: convenience goods, shopping goods and specialty goods. Convenience goods are low price products that consumers buy repeatedly, without putting much effort or thought into the purchase (gum, toilet paper, soap..); Shopping goods are products shoppers typically spend more time researching and comparing before they buy since they are less frequently purchased and have a higher price than convenience goods, although are still affordable (clothing items, small home decor..); Specialty goods, finally, are high-end branded products, rarely purchased,

with a significant economic impact and unique features, considered to be superior to other brands' products (iPhones, luxury cars, gourmet food..).

Cho (2015) decided to further study the impact of product type on the relationship between fulfillment quality and customer behavioral intention. The author found that differences in product type cause a modification of the path that conducts to repurchase intention. Therefore, e-retailers face distinct challenges according to the product they are selling, and their processes should be adapted.

When customers are waiting for an important purchase, the perceived uncertainty and riskiness, due to lack of information, are higher than when they are waiting for a non-important purchase (Ma 2017). Based on the literature analyzed above, we propose that the use of proactive notifications has a stronger impact on satisfaction of those customers who purchased a product belonging to the specialty good category.

H2: Product type acts as a moderator in the relationship between proactive notifications and customer satisfaction.

Familiarity with online shopping

Familiarity, in this study, is to be intended as the level of comprehension and expertise about online shopping procedures.

Chiu (2012) reports that a customer who reaches a high level of experience using a retailer's website, will automatically connect his/her behavior on the website to a satisfactory transaction.

Furthermore, when customers are highly familiar with the processes that characterize online shopping, they are incentivized to perceive the online shopping environment as a stable context to operate. (Wood et al., 2012)

Therefore, familiarity with online shopping was thus included in the model as a covariate variable in order to control its effects.

Proposed conceptual framework:
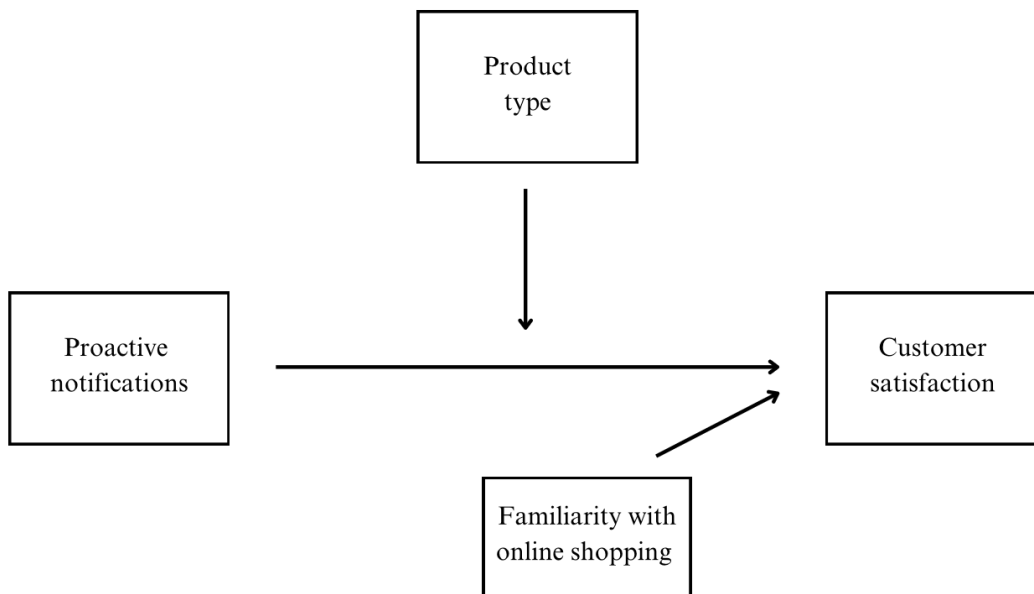
CHAPTER 3 RESEARCH METHODOLOGY AND ANALYSIS OF RESULTS

The aim of the study was to test whether the presence (vs. absence) of *proactive notifications* regarding the delivery status of an order has a positive effect on *customer satisfaction*.

Furthermore, it is predicted that the kind of purchase, particularly the product type, has a moderation effect on the relationship between the presence of notifications and customer satisfaction. *Familiarity with online shopping* was included in the model as a covariate.

To conduct the study, a 2 (proactive notifications: presence vs. absence) x2 (product type: specialty vs. convenience good) in between-subjects experimental design was used.

Respondents were asked to imagine having placed an online purchase having received it. Afterwards, they were randomly shown one out of the four possible experimental conditions: every respondent saw two images, one representing a product (either a laptop or a washing machine detergent) and one representing the notifications received before the delivery of the purchase (notifications or predicted delivery time).

Two pre-tests were conducted to verify the correct perception of the stimuli by the respondents. Both pretests were successful.

Convenience sampling method was used to recruit participants for the main study. Manipulation checks were included in the questionnaire and conducted using two 5-points differential semantic scales.

After the manipulation checks, respondents were asked to rate their customer satisfaction. It was used a 7-point likert scale slightly adapted from Blut (2016). The scale was tested through factor analysis and reliability analysis, which both produced satisfying results.

To verify the hypothesis, a two-way ANOVA was conducted using the software IBM SPSS Statistics. To investigate the role of the covariate I used an ANCOVA analysis, which, as well as ANOVA, comes with its own assumptions. Assumptions of both analysis were verified.

Results

It was hypothesized that the use of proactive notifications would enhance customer satisfaction with the order fulfillment process provided by an e-retailer.

This hypothesis was verified, as *customer satisfaction* was found to be higher when proactive notifications were present.

The second hypothesis concerned the presence of a moderation variable between the presence of notifications and customer satisfaction: product type. In this paper, products are differentiated on the basis of the traditional product classification scheme proposed by Copeland (1924). Two products were shown to participants: a laptop, to represent a specialty good, and a washing machine detergent to represent a convenience good.

Results revealed the absence of an interaction effect between the independent variable and the moderator; therefore it can be concluded that product type does not act as a moderator of the relationship presented.

Customers desire to be actively informed about the status of their purchases, regardless of the importance of the product they are awaiting

The reason to the absence of moderation may rely on two main elements, one related to the characteristics of the sample and one concerning the general approach to information that has been taking place in the last decades.

Firstly, the sample analyzed included mainly Italian people of a young age (around 24). Young people are mostly used to making online purchases. Consequently, it is probable that a part of the respondents has witnessed the proactive notification approach while waiting for a purchase. Having experienced the reception of proactive notifications regarding the status of a delivery would modify expectations, making the non-reception almost unacceptable, regardless of the product purchased.

Secondly, Italians are listed as high on Hofstede's uncertainty avoidance dimension (De Mooij & Hofstede, 2010). This indicates that Italians are not comfortable with the absence of clear and specific information, especially regarding events that will take place in the future.

Lastly, nowadays, consumers expect real-time and precise information regarding most of their daily activities, for instance, people who take public transportation are used to knowing exactly how many minutes they will have to wait (Lu et al., 2018). This availability of information does not only concern things with which people come into direct contact, but it applies also to local and world news (Sakaki, 2010) and to what their friends and colleagues are doing and where they are, almost at any given moment. (Roy, J., 2023). As a consequence, the expectation of receiving instantaneous information regarding a purchase is probably going to persist, in spite of the importance of their purchase.

Finally, considering that those who are highly familiar with online shopping procedures are more inclined to believe to be operating in a stable context, when purchasing from e-retailers' websites (Wood, 2002), *familiarity with online shopping* therefore it was included as a covariate. Ultimately, the variable was found to not have a significant influence on the model.

Limitations

First, analysis revealed the presence of heteroskedasticity throughs significant Levene's tests for equality of variances. However "a violation of this assumption has minimal impact if the groups are of approximately equal size" (Hair et. al, 2014).

Second, observations for both the independent and the moderation variable were not normally distributed. the central limit theorem states that, as the pool of observations grows (at least thirty observations) the normal distribution of the sample can be assumed.

Third, this study is limited by the choice of sampling method. The use of convenience sampling is not advised in quantitative research.

Fourth, the study was conducted on the results of a questionnaire that simulated an online shopping experience. Respondents did not concretely place an online order, therefore, the purchase process analyzed may have been perceived as different than an actual e-shopping experience.

Lastly, most of the participants to the study were Italian people of relatively young age (around 20), mostly attending university or having already obtained a university degree. Therefore, the generalization of the results is limited.

Theoretical implications

The current paper opens the gateway to a new stream of research regarding the use of proactive notifications to enhance the order fulfillment process in the context of online retailing.

Until now, existing models aimed at measuring online logistics service quality have not included this variable in the order fulfillment dimension. (Blut, 2016; Xing et al., 2010; Rao et al., 2011). Scholars

should be aware that new models for measuring e-lsq perceptions should be developed, in order to include notifications about delivery status as one of the impacting variables.

Managerial implications

Firstly, firms which are planning on opening an e-commerce website and chose to rely on an internal delivery companies must be aware of the necessity of implementing a notification system.

On the other hand, companies who decide to partner with a third party to handle their last mile logistics should evaluate the ability of the partner to provide a notification system to customers.

Firms that already have an e-commerce should evaluate to invest in an enhancement of their delivery processes, in order to incorporate the ability of sending proactive notifications to their customers.

By using proactive notifications, firms can reduce the amount of complains and questioning by customers, therefore lower their costs.

Lastly, results from the analysis displayed that firms can implement a notifications service for every order received on their website, regardless of the kind of product they are shipping.

Directions for future research

Perceived risk has been shown to have an effect on customer satisfaction when purchasing online (Chang et al., 2008). Moreover, customers perceive risk when e-shopping due to lack of information (Ma S., 2017), therefore, perceived risk could be studied as a mediator variable in the model, as notifications could allow customers to perceive a lower risk.

Literature has often focused on studying the influence electronic logistics service quality on on re-purchase intention. (Duarte et al., 2018; Adwan et al., 2022; Jain et al., 2021) Future research should examine the model that was analyzed in this paper, introducing re-purchase intention and other behavioral variables, for instance Net Promoter Score or Word of Mouth, as dependent variables.

Future research should investigate the role of consumers' habits and perceptions concerning the constant flow and storage of real-time information in the context of online delivery.

The combination of technologies like e-mail and SMS provides value-added services to both e-consumers and e-retailers. (European Commission, 2012). Nowadays e-retailers can take advantage of the large number of possible ways to contact customers: apps, email, SMS, or even social networks. Thus, as the effect of notifications on customer satisfaction was significant and positive, scholars should deepen their knowledge of which is the most effective and rewarding channel to use in order to deliver the notifications.

Lastly, this study was influenced by the characteristics of the sample analyzed. Respondents were mainly young people from Italy, attending university. The narrow age and geographical origin ranges may have reduced the generalizability of the results.

In the future, academics could test the proposed model by broadening the pool of observations.