Innovative Solutions in Last Mile Logistics

Assessment of the Feasibility of Large Retailers to Implement Crowdshipping

Master's thesis in Management and Economics of Innovation

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Cover:
The thesis cover illustration depicts a delivery person handing over packages to a customer, symbolizing the concept of crowdshipping in last mile logistics.

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Summary
The surge in online shopping, fueled by advancements in technology and recent global events like the COVID-19 pandemic, has drastically changed how consumers shop. With the rise in demand for fast and sustainable deliveries, retailers are exploring new solutions, such as crowdshipping. While previous research has focused on optimizing crowdshipping operations and understanding why people participate, there's still a gap in understanding how feasible and practical it is for retailers. This study dives into crowdshipping's potential for retailers to improve their delivery strategies while being environmentally conscious. Through a mix of research methods, including a literature review, interviews and a case study with IKEA, we found that while crowdshipping can cut costs and reduce environmental impact, it's tricky to implement in a way that doesn't create more delivery trips. A retailer looking to utilize crowdshipping to improve challenges of last mile related activities must identify the strategy that leverages the benefits of crowdshipping whilst mitigating the risks and downfalls, which depends on the company’s resources and capabilities, as well as the conditions in the market environment. This study sheds light on the real-world challenges and opportunities of crowdshipping for retailers, providing valuable insights for improving delivery logistics in today's fast-paced e-commerce world.

Keywords: Crowdshipping, Last-Mile Logistics, E-Commerce, Retail Solutions, Implementation Strategy

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It is with great excitement that we can finally publish our work, officially making us civil engineers. We would like to extend our heartfelt gratitude to ourselves for going the distance and enduring this challenging yet exciting task. Finally, we would like to thank you for taking the time to read our thesis.

Sincerely,
Anna Garnbratt & Casper Lindh
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1. Introduction

The following section provides an overview of recent developments in e-commerce and the challenges faced by retailers in meeting the demands of online shoppers. It introduces the concept of crowdshipping and the current discussions around it, as well as highlights the gap within research that the study has the goal of filling.

1.1 Thesis outline

In recent years, the landscape of e-commerce has seen substantial growth, tightly coupled with advances and adoption of mobile devices. It is also connected to global phenomena such as the COVID-19 pandemic. The prevalence of e-commerce has also been shown to impact shopping behaviors, where consumers are not only shopping more, but also have different expectations (Jaller et al., 2023). Retailers are experiencing increasing pressure to offer cheap and fast deliveries whilst adhering to sustainable practices, and are looking for new solutions to solve these challenges (Pourrahmani & Jaller, 2021). One such innovation that has emerged in recent years is crowdshipping, a concept whereby individuals or non-professional couriers with available capacity deliver goods to customers (Carbone & Roussat, 2017). Previous research into the topic of crowdshipping has categorized in two major strands; studies into optimization of operational factors and studies into behavioral aspects (Pourrahmani & Jaller, 2021; Voigt & Kühn, 2021).

Within the realm of optimization, studies aim to increase efficiency in last mile fulfillment, increase adoption, improve the matching process between delivery requests and shippers while reducing associated costs (Pourrahmani & Jaller, 2021; Santini et al., 2022; Zhen et al., 2021). Behavioral studies investigate the motivations behind participation, such as trust, monetary compensation, and environmental awareness (Cebeci et al., 2023; Punel et al., 2019). Through computations and simulations of crowdshipping, researchers find that one of the main benefits is saving on costs compared to traditional delivery methods for last mile, both for the crowdshipping service providers and for the recipients (Zhen et al, 2021; Punel et al., 2018). There are also benefits to the environment by making use of available capacity and not increasing the number of trips (Nascimento et al., 2023). Monetary incentives such as the potential to save on delivery costs as a recipient, or earnings as a shipper are found to be the strongest motivation for participation (Ghaderi et al, 2022; Pourrahmani et al., 2021). However, there are clear differences between findings in research regarding the potential of crowdshipping, and the observed effects when it is being implemented in reality. There is a gap in research for looking at the feasibility and viability of crowdshipping from the perspective of a company looking to improve their last mile delivery strategy.

The purpose of this thesis is to look into the potential of crowdshipping as a strategic tool for retailers to mitigate the negative impacts of last mile deliveries while aligning with the principles of sustainability. The dimensions of sustainability that are being investigated are economic, environmental and social, which have all been listed as potential benefits of crowdshipping, but not proven in a real life setting. By examining these dimensions, this research provides valuable insights into the viability and limitations of implementing and leveraging crowdshipping in the

business as a large retailer. As such, a case study with IKEA is conducted to get practical data on their ability to implement crowdshipping, and which strategy is best suited to do so. The method for data collection is a literature study, interview study and a case study. Findings from the case study will be generalized in a way in which all retailers can use the information to improve their last mile logistics. The interview study includes both researchers and stakeholders from IKEA and from crowdshipping platforms to contrast research with practice.

The results show that the potential of crowdshipping is dependent on the use of non-dedicated trips so as to not create more costs and environmental impact. This aspect is highly difficult to control, and real-life examples show that crowdshipping often creates more trips for the sole purpose of delivery. The economic benefits for a retailer is determined by the costs associated with implementing strategy, between building in-house, acquiring or a partnership. The potential to reduce negative environmental impacts is smaller than earlier studies suggested. This is partly because crowdshipping might create new trips, and partly because of factors such as the trip being replaced, the mode of transport, and overall efficiency. Also, there is little evidence to support the social benefits of crowdshipping such as creating a community and helping your neighbors because there are only a few cases where this has worked in practice.

The thesis is outlined as follows: Section 2 introduces last mile deliveries and related topics as well as the concept of crowdshipping, its benefits and drawbacks. Furthermore, it highlights the gap within current research, the aim of the thesis and the specific research questions. Section 2 summarizes the research method and methodology, outlining the different types of data and analyses employed in the study. Section 3 showcases the results of the study, organized according to the research questions. First, the result of the literature study, then from the interview with researchers and practitioners, and lastly the result pertaining to the implementation strategy for a retailer. Section 4 discusses the result of the study and the applications for retailers in general, which is condensed and summarized in section 5.

1.2 Research gap and problem formulation

With a significant portion of revenue coming from online purchases, retailers are looking for new solutions to solve the logistical challenges associated with the rapidly growing e-commerce landscape. Recognizing the potential for improvement in last mile logistics, one such solution is making use of crowdshipping to service home deliveries. Research on crowdshipping has predominantly been approached from an operational perspective, aiming to optimize the matching of supply and demand for lower costs and greater efficiency. While some analysis has been conducted on its viability as a business model, there is a noticeable gap in research when it comes to it being applied in the context of retailing. The results of existing studies sparsely highlight potential implications for managers when designing the service, but there is little research into leveraging crowdshipping within the business as a retailer.

The low amount of available empirical data that exists underscores the many challenges and pitfalls of implementation of crowdshipping as a service. Even so, such analyses are looking primarily at crowdshipping platforms that are created and run as a third-party courier service provider. However, a retailer looking to implement crowdshipping does so under different

circumstances, having a pool of customers to draw from as well as themselves being the origin of requests. Under these conditions, the challenges of a successful implementation might look entirely different, and so might the benefits of using crowdshipping. This research aims to bridge this gap, by looking into the feasibility of crowdshipping being implemented by a retailer as a solution to last mile deliveries, and what the benefits and drawbacks of doing so might be.

1.3 Aim

The aim of the thesis is to contribute to the understanding and research about crowdshipping as a solution to challenges associated with last mile logistics for retailers. This thesis covers benefits and drawbacks of crowdshipping, explores key parameters and constraints affecting its success, and provides insights into how large retailers can implement and leverage crowdshipping into their last mile operations.

RQ1: *What are the benefits and drawbacks of utilizing crowdshipping to address last mile logistics challenges in response to the growing demands of e-commerce, considering factors such as cost efficiency, environmental impact, and social implications?*

The first research question examines the topic of crowdshipping and identifies the key challenges related to the implementation within last mile logistics in the realm of e-commerce. Main focus is to look at the challenges from the perspective of retailers handling predominantly larger packages that can not be shipped by being sent by mail or using other similar existing and functional crowdsourced solutions. The study provides answers to the challenges by collecting and analyzing data from various sources such as literature, research papers and conducting interviews with relevant actors suitable for answering the research question.

RQ2: *What are the key parameters and constraints that influence the success of implementing crowdshipping as a solution for last mile deliveries in the context of retailers?*

The second research question evaluates the critical factors that need to be fulfilled for crowdshipping to be used as a last mile logistics solution for retailers. The investigation looks into the adoption of a crowdshipping model and the intricate dynamics behind such an implementation. Aspects considered and accounted for include: logistical requirements, operational complexities, cost implications, regulatory considerations, and technological dependencies. All of which assessed in relation to integrating crowdshipping as a last mile solution when handling larger packaging for retailers. By assessing these parameters the study aims to provide insights into how retailers can effectively navigate the implementation process and make informed decisions in relation to strategy to facilitate successful adoption and optimization of crowdshipping as a solution for last mile deliveries within the retailers existing ecosystems.

RQ3: *How could large retailers implement crowdshipping into their last mile deliveries, and how can it be successfully leveraged within the business?*

The third research question investigates and provides a potential strategy for how a large retailer might implement crowdshipping as a method to solve the last mile related supply-chain challenges. This part of the study will provide insights into the implementation process, specifically looking into the strategy that is best suited for crowdshipping to be leveraged within the business. To answer this, a case study is conducted at the large retailer IKEA. The meaning of this case study is to find necessary data surrounding retailers that can be analyzed in the context of findings from literature and the market for crowdshipping in the US.

2. Literature study

The literature study introduces two major concepts that are relevant to the thesis; last mile logistics and how it looks in the context of e-commerce retailing, and crowdshipping.

2.1 Last mile logistics

This section gives a background on the concept of last mile logistics in the context of online shopping. It also relates the concept of last mile logistics to other important societal phenomena such as the growth of e-commerce, the pandemic. Lastly, it also showcases some of the challenges of last mile deliveries, how it is currently being done and potential advancements.

2.1 Defining last mile logistics

Last-mile is defined as the last stage of the supply chain, where items are delivered to their final destination (Pourrahmani & Jaller, 2021). Other literature defined it as all logistical operations to the final step of the process with delivery to the final customer's door (Elvas et al., 2023). Lim et al. (2018) states that last mile in logistics refers to the final stage of a business-to-consumer parcel delivery service, spanning from the order penetration point to the end recipient. These definitions have a common foundation where goods are being moved from an origin to the end receiver. For individuals who shop online, this particular stage is of great importance as it has the potential to significantly influence customer satisfaction and loyalty, reinforcing its essential role in shaping the overall online shopping experience.

The main difference in last mile logistics between online shopping and traditional retail are within the delivery networks (McKinnon, 2016). Traditional retail primarily handles bulk goods from large centralized distribution centers to their brick-and-mortar stores, and from there the customers bring them home upon purchase. In this scenario, optimization of transport routes from the distribution centers to the stores and cost-effectiveness is central to performance (Mohri et al., 2023). For online shopping, deliveries have become more decentralized, with packages being delivered directly from distribution centers to individual customers (Boysen et al., 2022). This decentralized approach necessitates extensive planning to consolidate shipments and requires additional resources to ensure timely and cost-effective deliveries (Elvas et al., 2023). Research indicates that e-commerce results in fewer negative externalities compared to in-store shopping because of the possibility of consolidating shipments of goods (Pahwa and Jaller, 2022).

Customers that shop online also have different demands than in-store, and are pressuring logistics providers to reduce lead times so that goods are delivered faster to their convenience (Zhen et al., 2021; Arditi & Toch, 2022). The preferred method of delivery for online shopping is home deliveries, and offering a shorter delivery time has been shown to increase customer loyalty. This is problematic for the service providers since a shorter lead time decreases the possibility of consolidating deliveries and increasing drop density by improving routing (Piecyk et al, 2021). As a result, the cost of last mile shipments are increasing due to underutilization in vehicle loads and the lack of route optimization (Pourrahmani & Jaller, 2021; Bajec &

Tuljak-Suban, 2022; Ausseil et al., 2024).

2.2 E-commerce

E-commerce refers to the buying and selling of goods online using the internet and has grown to an integral part of the global retail scene, and is expected to make up a quarter of the total retail sales as of 2027 (Statista, 2024a). As consumer preferences are shifting towards online shopping and global internet access increases, the diffusion and adoption of e-commerce continues to grow (Statista, 2024b). The move towards online markets have been facilitated by advancements in technology e.g., the introduction and diffusion of the internet and smartphones have been essential for its growth (Piecyk et al, 2021; Yuan et al., 2020). Such technological advancements have made it possible for the shopping experience to become more convenient and accessible for everyone, resulting in more shopping than before.

E-commerce has revolutionized the way we do our shopping, and this has had a disruptive effect in the retailing sector. Online customers have a different set of expectations on the shopping experience, especially when it comes to the speed, cost and reliability of last mile deliveries (Pourrahmani & Jaller, 2021). There is also evidence that suggests that the growth of e-commerce has had a significant impact on shopping behavior, where consumers tend to shop more regularly due to the increased convenience (Jaller et al., 2023). Additionally, access to information online gives consumers a broader selection and better price comparison, prompting retailers to change their strategies to remain competitive in an increasingly competitive market. (Comi & Savchenko, 2021).

2.3 Retailers

Retailing refers to the selling of goods and services to consumers that are the end user (Montevirgen, 2024). They are the last step in the supply chain downstream towards the customer with regards to ownership. Like any business, retailers can vary in size, ranging from a local store to larger enterprises. Small and medium businesses are typically characterized by having less than 1$ billion in revenue. Large businesses are often characterized by being international, appealing to a wide range of customers and being organized as corporations (indeed, 2022). Retailing is a highly competitive market with special emphasis on factors such as price, branding, reputation, and having an efficient delivery system (Montevirgen, 2024). Because of the high level of competition, it is important for retailers to understand how they want to position themselves in this space, and how they are going to attract customers to their stores.

To this end, retailers must recognize that shopping is more than a transaction, it is an immersive experience. Physical stores serve as platforms for retailers to cultivate a sense of community through branding initiatives, but with more revenue moving online retailers need to achieve the same effect in e-commerce sales (McKinsey & Company, 2021). Omni-channel retailing is the combination of traditional brick-and-mortar with online stores. To achieve this, retailers need to unify their business solutions, and delivery models across product segments and channels, as consumers expect a seamless shopping experience and consolidated delivery, regardless of the ordering channel (Deloitte, 2015). Verhoef et al. (2015, p. 3) defines omnichannel management as being “the synergetic management of the numerous available channels and customer

touchpoints, in such a way that the customer experience across channels and the performance over channels are optimized." Concurrently, the rise of the sharing economy has introduced a new dimension to retailing, allowing countless small service providers and individuals to tap into a global customer base. Emerging technologies have allowed omni-channel retailing to surge in popularity, creating a shift in the retail landscape. Global brands can leverage omni channel management strategies to meet the escalating demand for convenient access to products and services driven by digital and sharing economy models (Cai & Lo, 2020).

Alongside this shift in strategies there has also been a shift in priorities. Sustainability has emerged as a major concern. For this purpose, many retailers are looking to alter their shipping methods to promote more environmental practices (Bajec & Tuljak-Suban, 2022). E-commerce is specifically expected to increase delivery vehicle transportation in inner city areas by up to 36% (Ghaderi et al., 2022). Overall, increased traffic from transportation creates challenges such as traffic congestion, heightened air pollution and carbon emission levels, additional strain on infrastructure most of these coming from use of different types of vehicles (Piecyk et al., 2021). To address some of these challenges, there are many new policies being put in place by institutions and policy makers to develop strategies for sustainable urban mobility and sustainable urban logistics (Elvas et al., 2023). However, there are currently no solutions that can meet these new targets, calling for the need for innovation to create more sustainable means of last mile delivery (Bajec & Tuljak-Suban, 2022).

2.3 The COVID-19 pandemic

Another phenomenon that has had a big impact on shaping developments within shopping and logistics is COVID-19. The pandemic brought significant change to economies and societies world-wide, and the changes that were made to how we operate daily have had lasting effects. Lockdowns, social distancing and a collective uncertainty of availability of goods have changed consumers' purchasing behaviors. It also acted as a catalyst for web-based business models, causing a switch to online purchasing instead of the then prohibited traditional brick-and-mortar retailing (Jagoda et al., 2023). As consumers rapidly switched to e-commerce, online sales surged across various product categories. This change resulted in global retail e-commerce increasing to US $4.248 trillion (increase of 26.4%) for 2020 alone (Cramer-Flood, 2022). Businesses were forced to adapt their business models and services to address the online demand to be able to survive, which put a huge strain on profitability (BCG, 2021).

The pandemic underscored the importance of logistics fulfillment and the need for infrastructure to support e-commerce growth, since transportation of goods was essential to sustain citizens in cities (Nascimento et al., 2023). In addition, it made consumers more aware of some of the negative aspects associated with last mile delivery. For example, a survey by BCG (2020) found that up to 70% of people became more aware of how the climate and damages to the environment can negatively impact humans during the pandemic. Moreover, 86% of the respondents called for companies to integrate environmental concerns into their offerings. This awareness is also reflected in purchasing behaviors, where a study by Hillyer (2021) found that 56% of millennials cite environmental protection as the reason for not opting for home delivery. In general, the pandemic was found to have accelerated the decarbonization of last mile

deliveries and pushed companies to ramp up commitments for environmentally sustainable deliveries.

2.4 Challenges of last mile

The final stage of the supply chain is currently deemed as the most difficult and inefficient from a sustainable perspective (Pourrahmani & Jaller, 2021; Devari et al., 2017). This critical stage of the supply chain presents a wide range of challenges, where one noticeable problem is regarding complexity. The delivery vehicles on the road navigating the urban and suburban landscape are faced with operational challenges such as failed delivery attempts and inefficient routing. The high expectations from customers to have short delivery times also impede the possibility of consolidation, and the many dispersed delivery destinations make last mile delivery the most inefficient part of the supply chain process (Fessler et al., 2022). This, in combination with the fact that freight providers often have lacking strategies to address the challenges within the inner-city deliveries, especially within emerging and developing economies (Comi & Savchenko, 2021). These contribute negatively to congestion, emission, accidents, and wear and tear on road infrastructure (Pourrahmani & Jaller, 2021; Jaller, 2023). Ultimately, the challenges of last mile delivery can be traced to three main categories: economic, environmental, and social, which help define the complexities of this crucial stage in the supply chain (Pahwa & Jaller, 2023).

Economic factors also play a pivotal role within last mile delivery. The last mile segment of the supply chain accounts for 13% to 75% of the total supply chain costs (Devari et al., 2017). Part of the problem are the high direct costs associated with last mile delivery such as labor, fuel, vehicle maintenance, management and overhead processes. Furthermore, the fragmented nature of last mile shipping, with many small deliveries across an extensive network of delivery points, limits the possibilities for cost reduction when compared to earlier transportation processes in the supply chain (Fessler et al., 2022; Tapia et al., 2023). The lack of room for consolidation leads to low load utilization, increased fuel consumption, higher unit delivery cost, which affects profitability and operational efficiency in last mile operations. Additionally, e-commerce growth has brought more players into the market, increasing the competition between logistics providers, pressuring prices and lowering margins (Sampaio et al., 2019).

Environmental sustainability has also emerged as a major concern within last mile delivery, as the operations necessary for delivering parcels at their final stage in the supply chain exert significant environmental impact. Research indicates that as much as 40-70% of energy and emissions from the e-retailer supply chain are within the last mile deliveries (Pourrahmani & Jaller, 2021; Milewski & Milewska, 2021). Some examples of environmental challenges are the substantial amount of emissions from delivery vehicles in the last mile, responsible for 25% of GHG emissions from all transportation, contributing to air pollution and accelerating climate change. In addition, deliveries often take place in urban areas where populations are dense and emissions pose health risks to residents (Halldórsson & Wehner, 2020).

The ability to integrate freight into passenger mobility poses challenges for both policy makers and managers of service providers. Policy makers are focusing more on sustainability strategies

now, which can be seen as strategies for sustainable urban mobility and urban logistics (Elvas et al., 2023). Sustainable freight is found to be key in improving the city landscape, and crowdsourcing the manpower needed for it offers great prominence (Ghaderi et al., 2022; Jagoda et al., 2023). A case study in Serbia found that it is better for policy makers to promote a transition to better fuels and a modal shift to achieve sustainability (Bruzzone et al., 2023). Another study that forecasted future shopping behaviors in urban areas found that policymakers and urban planners can devise more efficient strategies to reduce the environmental impact of shopping-related travel by taking into account population growth, demographics, and implications of technology adoption (Jaller et al, 2023). Addressing these environmental concerns requires innovative solutions in which environmental sustainability is central (Ghaderi et al., 2022).

Societal trends can have a large impact on the shape of, and success of deliveries within the last mile. The trend of urbanization has moved a large share of the demand for last mile delivery to densely populated urban environments. This, in turn, has introduced challenges such as navigating through narrow streets, limited parking areas, and traffic congestion. The effect of these challenges on operations is the increased time and resource spent which contributes to driving up the costs associated with managing resources in and around cities (Sampaio et al, 2019; Ghaderi et al., 2022). Another side of the social aspect are factors such as comfort, safety, and security when traveling around in urban environments, and how role last mile deliveries affects this (Jagoda et al., 2023). The current literature landscape is lacking in addressing social parameters for solving last mile challenges with crowdshipping. Moreover, there are challenges in addressing consumer expectations in last mile delivery. One prominent example is that most consumers prefer to get their packages through home delivery. Although this is convenient for the customers, it is the least favorable from a sustainability perspective (Buldeo Rai et al., 2019).

It is therefore important to address these challenges in a way that not only logistical and operational aspects are considered, but also economical, environmental and social implications of last mile delivery (Pahwa et al., 2023). Collaboration between stakeholders such as logistics providers, retailers, policy makers, and urban planners are essential to develop a plan in which these challenges can be taken into account, whilst ensuring efficient and timely deliveries (Strulak-Wójcikiewicz & Wagner, 2021). Through collaboration and innovation is it possible to implement strategies that optimize delivery routing, minimizing environmental impact, and increasing overall efficiency of last mile deliveries (Pourrahmani & Jaller, 2021). Ultimately, this requires a multifaceted approach that includes different perspectives on how to handle last mile delivery, to meet the diverse and ever evolving needs of consumers, while working for a more sustainable and efficient last mile delivery system.

2.5 Current state of solutions and technologies

Last mile deliveries exist in many different forms and work best in different situations depending on characteristics such as customer preferences and logistical constraints. Traditional shopping, when customers buy an item in-store and then take it with them on their way home, does not suffer from the same challenges of last mile deliveries since the customer handles the

transportation to their home (Piecyk et al., 2021; Halldórsson & Wehner, 2020). For example, for delivery of goods purchased online, there are challenges such as missed delivery and security issues of handling (Halldórsson & Wehner, 2020). Navigating this landscape of last mile delivery requires a holistic approach, considering not only the delivery methods themselves but also the extensive ecosystem of service providers that directly conduct the logistical activities.

There are different types of service providers when it comes to logistics activities, depending on the characteristics of the delivery or shipment. From a global perspective there are large integrators such as DHL and FedEx and national postal operators such as USPS (US) (Patowary et al., 2020). Moving from a macro perspective to a micro, there is typically a distinction made between standard delivery services and courier services. Standard delivery services are often routine based and non-urgent, whereas courier companies generally offer more flexible solutions that are tailored to flexibility in creating solutions to the particular shipping request (KT ALB Transport, n.a; RTD Logistics, n.a.). Within the realm of local transportation, three commonly mentioned groups of service providers are courier, express and parcel service providers. These providers play a critical role in the facilitation of freight movement and are responsible for the optimization of service to ensure efficiency across the interconnected components that characterizes last mile delivery (Voigt & Kühn, 2021; Jagoda et al., 2023).

Efficient last mile fulfillment is a function of three components: distribution structure, transportations execution and household logistics capability. The distribution structure consists of functions such as shipment origin, point of reception, attributes of delivery process and actors' involvement in the shipment. Transportation execution is differentiated by either commercial or private transportation, its mode, vehicle size and type. Households logistics capacity is dependent on the end consumers role in which it requires skill, involvement and resources for end of supply chain processing (Halldórsson & Wehner, 2020). By integrating these factors, businesses can enhance the efficiency of their operations and improve customer satisfaction in last mile delivery, ultimately creating a more sustainable ecosystem for last mile operations in the future.

2.6 Advancements in Last Mile Delivery Solutions

Service providers and retailers are working continuously to find new methods that enable sustainable practices while being fast, reliable and cost effective (Santini et atl., 2022; Pourrahmani & Jaller, 2021). The rapid growth of e-commerce, facilitated by factors such as the digital devices and the pandemic has drastically changed the landscape for last mile delivery solutions (Pahwa et al., 2023). New technologies and solutions have thus been integrated within last mile logistics operations to support these changes, aimed at addressing the ever evolving challenges that emerge from changing customer preferences (Fessler et al., 2022; Sampaio et al., 2019; Ballare & Lin, 2020). These new methods of last mile delivery have brought many cutting-edge technologies and creative strategies in which to tackle the many challenges of the last mile delivery i.e., the most difficult part of the supply chain (Fessler et al., 2024).

One notable emerging solution in the environmental field includes collaborative platforms

(Energy5, 2023). Collaborative solutions enable unexploited transport in local communities to be utilized (Comi & Savchenko, 2021). As the landscape of e-commerce continues to grow, the urgency for environmentally friendly delivery methods becomes evident, accentuating the need for innovation and community engagement (Piecyk et al., 2021; Carbone et al., 2017). Logistics providers and retailers are also placing greater emphasis on specific customer needs and preferences (Jagoda et al., 2023; Comi & Savchenko, 2021; Sampaio et al., 2019). To this end, there has been a greater use of data analytics which presents an opportunity to make use of artificial intelligence and machine learning algorithms to optimize delivery and improve efficiency and reduce costs (Piecyk et al., 2021; Giret et al., 2018). This, combined with increased investments into more sustainable last mile delivery methods, logistic providers and retailers can reduce their environmental impact and appeal to more customers by being sustainable (Jagoda et al., 2023; Wang et al., 2016). Although these solutions might work in theory, there are a lot of challenges to overcome before it can be implemented in practice.

2.2. Crowdshipping

The exploration of existing literature on the topic of crowdshipping highlighted a gap. This section will review relevant literature to explain, define and assess crowdshipping, as a solution to challenges associated with last mile deliveries.

2.2.1 Crowdshipping definition

The idea of collaboration between individuals in society and the sharing of resources in a crowd has had a boom in recent years (Ausseil et al, 2024). The concept of “sharing economy” is something that is still growing, and is tightly coupled with advancements and adoption of technology that facilitates the exchange. The main distinction between sharing economy and other traditional business models is the emphasis on temporary access rather than ownership, as well as the reliance on the internet and use of information technology (Punel et al, 2019). The transportation sector is also being affected by new businesses coming from the sharing economy, one such innovative concept being crowdsourced logistics (Devari et al, 2017; Punel et al, 2019). The foundation of the concept is that individuals in the crowd have underutilized resources that can be used to carry out logistic activities such as storage, shipping and home-deliveries (Carbone & Roussat, 2017; Voigt & Kühn, 2021).

The concept of crowdshipping emerged during 2012 from under the umbrella of crowdsourced logistics, and has the potential to disrupt the industry (Mohri et al., 2023, Punel et al. 2018). Although crowdshipping has existed for over a decade, researchers have yet to agree on a definition. In its most basic form related to the concept of crowdsourcing, as Mehman et al. (2019) defines it as the outsourcing of logistics services to a mass of actors. The authors then add that it is supported by technical infrastructure, and that it has the goal of achieving benefits for all stake and shareholders. The idea that crowdshipping is coupled with the use of mobile devices, internet and information technology is something echoed by many scholars (Fessler et al, 2022; Strulak-Wójcikiewicz & Wagner, 2021; Le & Ukkusuri, 2019; Le et al., 2019; Voigt & Kühn, 2021; Tapia et al, 2023).

Central to the concept of crowdshipping is the type of trip being carried out, and by whom. The type of trip exists in two categories: dedicated and non-dedicated trips, also called opportunistic trips (Nascimento et al, 2023; Zou & Kafle, 2023). This idea of either creating a trip or utilizing an existing one are two aspects that have been explored to find which yields the most benefits (Giret et al, 2018). Some researchers conceive that crowdshipping is only prominent in the case of non-dedicated trips where travelers bring parcels along an already existing route (Sampaio et al. 2019; Punel et al, 2018; Cebeci et al, 2023; Comi & Savchenko, 2021; Piecyk et al., 2021). In criticism to this, studies have found that the creation of new trips to carry out deliveries is one of the risks of crowdshipping, and something that takes away from the benefits of not using traditional delivery services (Bajec & Tuljak-Suban, 2022; Pourrahmani & Jaller, 2021). When it comes to the question of who, those partaking in crowdshipping can come from different sources. Pourrahmani & Jaller (2021) describes crowdshipping to involve several actors, including senders, couriers or shippers, and receivers. The shippers can be commuters, van drivers or courier companies with spare time, and the senders could be individuals or companies (Tapia et al. 2023). The shippers can make use of cars, motorbikes, bicycles, walk or travel via public transportation (Comi & Savchenko, 2021). Devari et al (2017) explores the possibility of utilizing social networks of retail store customers for deliveries, and Boysen et al (2022) looks at using the employees. The link between crowdsourcing and crowdshipping also implies that participants are only registered, not contracted or employed (McKinnon, 2016; Voight & Kuhn, 2021).

Beyond the receivers, the senders and the shippers there is the space where these interactions take place; a platform that is managed by the service provider. To the point of what such a platform encompasses, Buildeo Rai et al. (2017, p. 1) provides the definition “Crowdshipping is an information connectivity enabled marketplace concept that matches supply and demand for any kind of transportation of goods with an undefined and external crowd that has free capacity with regards to time and/or space, participates on a voluntary basis, and is compensated accordingly”. The platform can be described to have four main types of functions; matching tasks to crowdshippers, setting a price for the delivery, finding the route to travel with regards to origin and the delivery point, and scheduling pick-up and drop-off time (Mohri et al, 2023). Some other common features to ensure user satisfaction, delivery safety and security and includes mechanisms for rating, vetting, tracking, and signals of confirmation (Le et al., 2019).

2.2.2 The state-of-practice and crowdshipping market

The crowdshipping market is still in its infancy and is highly dynamic, evolving due to factors like technological advancements, changing consumer preferences, and competitive pressures. They first started to appear within the US market, and that’s where the industry has its stronghold, even though it has also spread into different parts of the world (McKinnon, 2016). The non-food online retailing is mainly orders placed with professional full-time retailers (B2C), but there are also a growing number of private individuals doing this through marketplaces such as eBay (C2C) (Piecyk et al., 2021). Crowdshipping can be applied in both cases, but the provider behind the service can vary greatly. A study by Pourrahmani & Jaller (2021) looks into the state of practice for crowdshipping platforms and synthesizes some of the important dimensions. The authors identify four main contributors that differentiates crowdshipping services, and one of

these is the type of platform. Within platform type, they identify categories as being exclusive or private, on-demand, community driven, shipping and shopping platforms and lastly last mile delivery to or from local carriers, and these are outlined in Table 1. Beyond these five categories, there is also the possibility of collaborations between retailers and crowdshipping platforms.

Table 1 Platform types (Pourrahmani & Jaller, 2021; Sustainabilityguide, n.a)

Platform type	Brief description	Example
Exclusive or Private	The private platforms are designed by retailers and utilizes their exclusive customer crowds	Amazon Flex
On-demand	On-demand delivery platforms facilitate matching between supply of shippers and demand of requests	Uber Rush
Community driven	The community based platforms rely on a community of senders and couriers that communicate between themselves	Nimber
Shipping and Shopping	Shipping and shopping platform is where the service includes both shopping in-store and home deliveries	Instacart
First/last mile Delivery to/from Local Carriers.	The delivery to or from local carriers entails crowdsourced couriers are working in conjunction with local carriers or other delivery service	DHL MyWays

Building on the works of Alnaggar et al. (2021), a timeline of how the crowdshipping market has evolved during recent years has been put together, as shown in Figure 1. This is an non-exhaustive timeline of crowdshipping platforms on the market from 2011 until 2023. The platforms originate across the globe, but the majority come either from the US or from Europe. The timeline includes crowdshipping of different designs, both those considered crowdsourced and peer-to-peer such as DHL Myways and Amazon Flex using a mix of self-employed and professional couriers (Dablanc et al., 2017). Although some companies have expanded internationally, many still exist within their niches. Noticeable collaborations between crowdshipping service providers and retailers during this time includes Walmart and Spark delivery, Walmart and Postmates, Target and Shipt, Zalando and Trunkrs, and a pilot between IKEA and Nimber (Zhen et al., 2021; Purrahmani & Jaller, 2021; Mottes, 2023). The parcel

market is becoming increasingly competitive as more companies recognize its importance for future logistics systems. Whilst some of these initiatives grow and spread internationally such as UberEats and AmazonFlex, many are not able to become profitable. Small actors in this industry especially face a range of challenges, including experimenting with business models, formulating effective ramp-up strategies, grappling with under-capitalization, managing operating deficits, coping with high failure rates, and navigating merger activity (McKinnon, 2016).

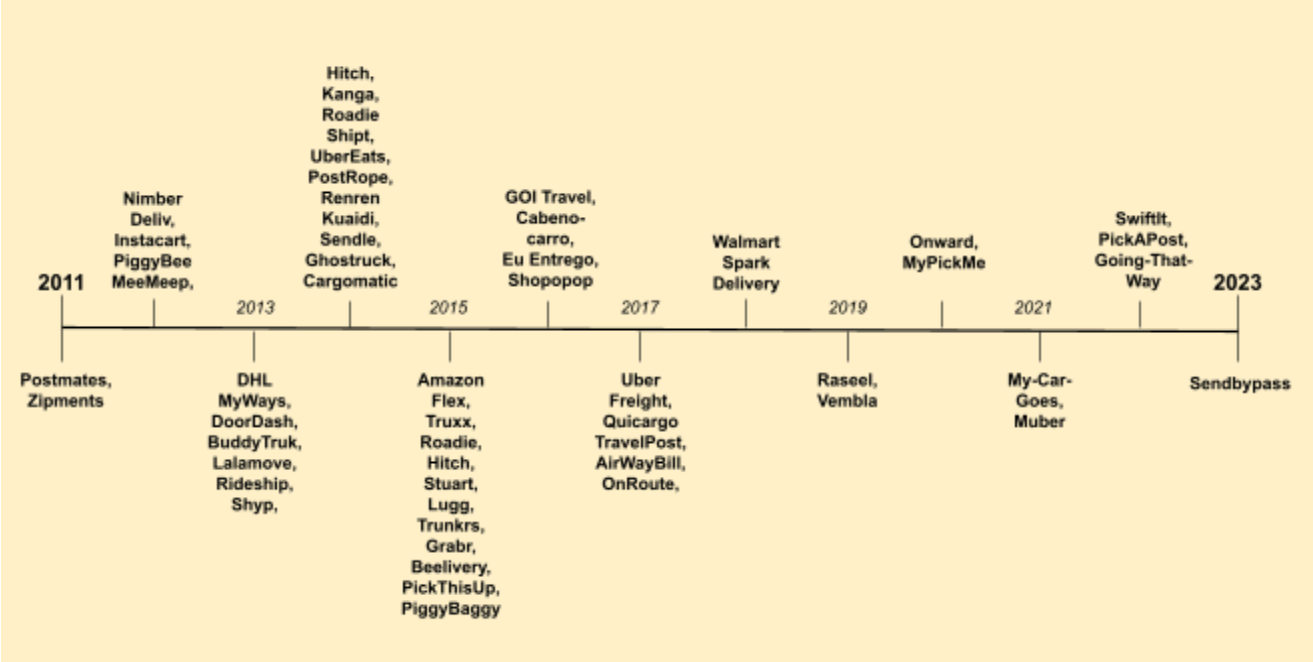

Figure 1 Timeline of crowdshipping platforms on the market

Looking more at the market potential for crowdshipping, there is little to no available information. This is partly due to the market not being mature, and partly because there are still many uncertainties and unanswered questions when it comes to defining the concept. However, given its relationship to the growth of e-commerce in general, such market insights can give an indication of the future potential of crowdshipping. The total global retail e-commerce sales hit 5.8 trillion US dollars in 2023, and is expected to surpass 8 trillion as of 2027 (Statista, 2024c). In general, sellers expand and improve their online delivery capabilities to adhere to the expectations of the online shoppers across a range of product categories. The dynamics of E-commerce are changing and are reflecting a broader trend where speed and convenience are becoming as highly valued as cost savings (Forbes, 2022).

Furthermore, crowdshipping is also linked to customer preferences when it comes to deliveries from online purchases. The same-day delivery market is expected to reach $26.4 billion U.S. dollars globally as of 2027 (Statista, 2022). Only within the US, it is expected to grow to reach $13.15 billion U.S. dollars in 2030 (Statista, 2024d). Furthermore, courier, express and parcel delivery companies in the United States handled more than 19.5 billion parcels in 2022, generating around $136.6 billion in revenue. Within the US, the four leading delivery providers

hold almost 98% of the market for couriers and local delivery service. Figure 2 shows that although the three major delivery service providers UPS, FedEx and USPS control the majority of the market, the large e-commerce retailer Amazon have also taken a significant share of revenue (Statista, 2024e). This indicates a shift, where a retailer that is a huge source of deliveries also controls the fulfillment part of their supply chain. During the pandemic, major global online retailers like Amazon worked to expand their last mile delivery capacity, which presents an additional challenge and threat to traditional parcel carriers (Piecyk et al., 2021). Another area in which traditional service providers are said to be struggling, and where there is room for new entrants, is in express deliveries, where their distribution system is too inefficient (Ballare & Lin, 2020). The express delivery market is expected to reach $699.21 billion U.S. dollars by 2031, growing at a CAGR of 9.7% from 2024 to 2031 (Skyquest, 2024).

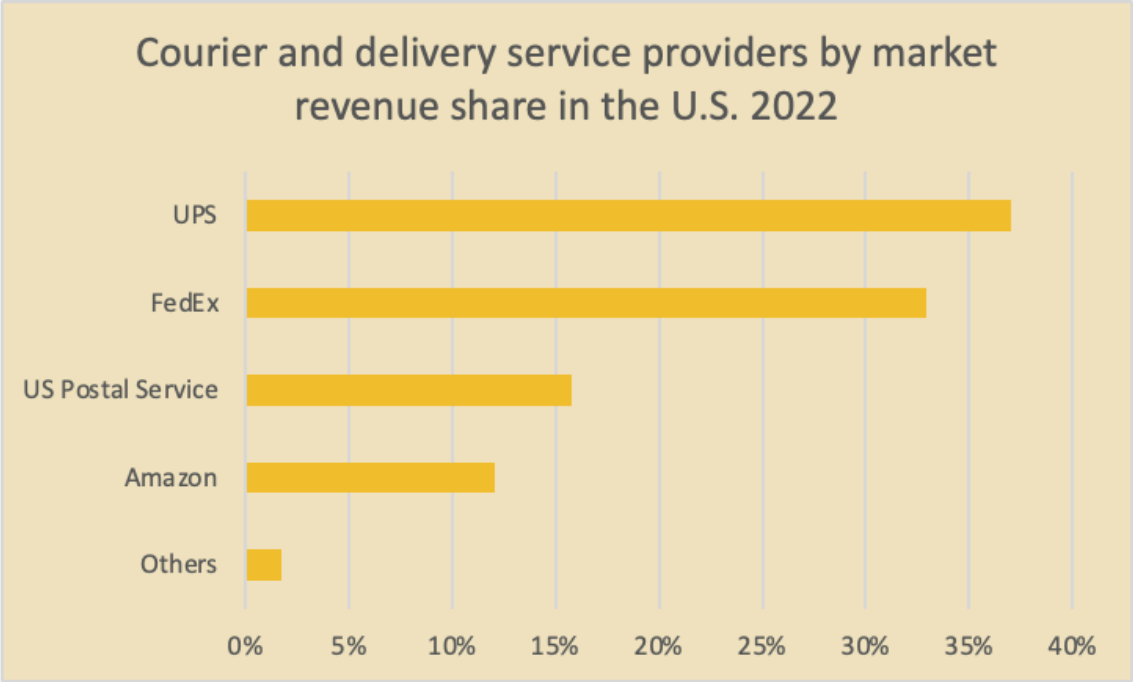

Figure 2 Dominant players US market 2022 in delivery service by revenue

2.2.3 Efficiency and cost savings

There are many different ways to model optimization problems to increase efficiency of operations. Santini et al. (2022) look to optimize crowdsourcing using a traveling salesman problem with the condition that the salesman doesn't travel to every customer. The study finds that crowdsourcing can save costs and reduce total miles, and through making use of drivers with a pre-existing route, trust and social engagements can be increased. Assigning shippers delivery tasks rather than having them grab them freely has also been argued to increase profits for the service providers, and wages and utilization of shippers (Zhen et al., 2021). Another study also found that utilization of each individual shipper can be increased, as well as decreasing costs associated with deliveries, by allowing for delivery routes to be broken down into several trips, referred to as transshipments (Voigt & Kühn, 2021). More generally, many scholars are looking to build models, algorithms, simulations and programming techniques to

find cost-min flow, shortest possible route, match demand and supply and achieve high acceptance and delivery rate for crowdshippers (Wang et al., 2016; Ghaderi et al., 2022; Santini et al., 2022; Tapia et al., 2023; Allahviranloo et al., 2019).

Those that advocate for cost-efficiencies when using crowdshipping are mainly focusing on operational costs. A case study in Ukraine on the different modes of transport for last-mile delivery found that using a car was the best alternative for saving on internal costs, while walking was the worst in terms of cost per delivered item (Comi & Savchenko, 2021). Another area with potential for cost reduction is labor costs, where the cost of crowdsourced manpower is lower than that of a third party delivery service provider. Crowdshipping, compared to traditional delivery services like USPS, UPS, or FedEx, tends to be cheaper for similar delivery requests, also allowing for greater flexibility and customized service. This gives the users more control over pick-up and delivery conditions through the use of smartphone technology (Punel et al., 2018). Many platforms also do not reimburse for additional costs such as fuel, parking, tolls etc.. Still, these cost-efficiencies are dependent on a number of factors and constraints (Pourrahmani & Jaller, 2021).

The most fundamental factors and constraints of achieving lower costs using crowdshipping is making use of available capacity i.e. non-dedicated trips (Nascimento et al., 2023; Fessler et al., 2024). The lack of optimization and increased travel time due to congestion can increase costs (Cebeci et al, 2023; Sampaio et al., 2019). McKinnon (2016) also finds that casual crowdshipping, meaning receiving just one package to transport, is uneconomic for the shipper, and also adds an extra link to the supply chain that could have been avoided through using a single courier service provider. Also, using inexperienced drivers increases inefficiencies as compared to using experienced, where experienced drivers are shown to drive 44% less distance, spending 35% less total time and also less time on parking per parcel. This is found to be because of lack of prior knowledge into best routing and processes (Bates et al, 2018). There are also studies that don't find evidence to support cost reductions as a benefit of crowdshipping, since it comes with high administrative costs and investments in facilitating infrastructure (Pourrahmani & Jaller, 2021).

Current research into crowdshipping lacks insights into how different retailers put varying degrees of value on performance metrics such as cost, and how this influences the design of a crowdshipping implementation. There is also limited information into the investments that are necessary for creating a crowdshipping service and how to market it to gain the necessary amount of participants to make it work. Additionally, there is limited or no understanding of additional costs incurred once the platform is operational. Research mentions different mechanisms and processes that are good to have in a crowdshipping platform, but does little to investigate the costs these would incur further. Scaling the platform and increasing the number of participating customers and shippers requires investments in advertisement and promotional material (Nascimento et al., 2023). Some mechanisms that have been said to increase trust and reliability is vehicle registration, background checks and training in handling for shippers (Pourrahmani & Jaller, 2021; Voigt & Kühn, 2021; Piecyk et al., 2021). Also, including backend

development to allow such as pricing and vetting mechanisms, marketing activities to attract more participants and customer support services to handle issues from lost or damaged goods.

2.2.4 The environment and negative externalities

Ghaderi et al. (2022) identify another research strand to be one developing business models and understanding implications within the realm of crowdshipping. They emphasize a notable gap in the literature concerning studies that investigate the environmental aspects of crowdshipping. This sentiment is echoed by Sampaio et al. (2019, chapter 15), which highlights that despite the potential for environmental benefits associated with crowdshipping, the predominant focus in existing literature revolves around operational aspects such as compensation schemes, transport modes, and flow matching. Also, Sampaio et al. (2019) suggest that while there is recognition of the environmental potential, studies assessing these benefits quantitatively and qualitatively yield contradictory results. This highlights the complexity and nuance involved in understanding the environmental impact of crowdshipping, necessitating further research to elucidate its implications comprehensively.

The environmental potential for crowdshipping is to reduce the total mileage driven for the purpose of making deliveries by making use of existing trips, which reduces emissions and energy use (Piecyk et al., 2021). Crowdshipping could also motivate using more sustainable modes of transportation such as cargo bikes or public transit if implemented successfully (McKinnon, 2016). This can decrease the number of delivery vans and vehicles in general, alleviating congestion and decreasing emissions (Tapia et al., 2023). Elvas et al. (2023) finds that the most positive effects can be achieved by embracing a changing paradigm towards more environmentally friendly and efficient delivery methods. This includes changing some fundamental aspects such as the mode of transportation and the point of delivery to instead making use of collection points. Also, if shippers are allowed to carry multiple packages, deliveries that match the shipper's existing route can be consolidated and thus decrease the number of trips overall, as well as the negative externalities associated with deliveries (Voigt & Kühn, 2021; McKinnon, 2016).

Conversely, studies also found that crowdshipping could lead to an increase in the total distance traveled and subsequently also the emissions (Tapia et al., 2023; Cebeci et al., 2023). Important to note is also the type of trip that is being replaced; if shopping by a diesel car is replaced by an electric car it can have a positive net benefit, but if driving replaces walking or public transit, it will have a negative net benefit. It is also difficult to control that the participants in the platform are individuals from the crowd as findings in practice indicate that commercial carriers also partake (Piecyk et al., 2021). Tapia et al. (2023) proposes that such impacts can be attributed to the difficulty of optimization and the possibility of a rebound effect when trying to satisfy demand. Although cars were found to be the best considering the internal costs of crowdshipping, it was shown to still have negative effects considering the external costs such as GHG emissions, safety, noise and congestion (Comi & Savchenko, 2021; Ghaderi et al., 2022).

As mentioned previously, sustainability has emerged as a concern for many businesses, including retailers. Still, many e-retailers are looking to increase market share through faster

deliveries and free returns are leading to higher costs, emissions and distance traveled (Jaller et al., 2023). With customer demand and regulatory requirements shifting towards green products and services, businesses must find better ways to incorporate sustainable practices within their business models. This is especially true for retailers within e-commerce that are tasked with finding more sustainable offerings, whilst also fulfilling customer demands for cheap and fast deliveries. Studies into the topic of crowdshipping are lacking to account for how a businesses strategy influences the implementation of such greener delivery solutions into the business, the potential benefits and the risks. Especially, the tradeoff between short term profits and long term environmental sustainability can be important for how the process for last mile deliveries for a retailer is designed.

2.2.5 Social equity, community and willingness to participate

The third part of how crowdshipping can contribute to sustainability is through social implications such as urban comfort, safety, and security (Jagoda et al., 2023). Cities and densely populated areas are especially struggling to cope with the rising demand from e-commerce when it comes to questions of freight mobility (Comi & Savchenko, 2021). The growing volume of last mile deliveries increases traffic congestion, accidents, vehicle noise, illegal parking, and prolonged waiting times for public transport in cities which affects the everyday life of citizens. Addressing these challenges requires innovative solutions to balance the benefits of crowdshipping with the need for sustainable urban living (Jagoda et al., 2023). Since crowdshipping has the potential to alleviate some of these urban challenges, it can contribute positively to social sustainability. In addition, crowdshipping can serve as a means to promote social equity by providing deliveries to individuals in vulnerable situations, ensuring ongoing access to essentials when in-store shopping options are restricted. It also creates the opportunity to promote a peer-to-peer model within the community and a sense of helping your neighbor (Sampaio et al., 2019).

Fessler et al. (2024) finds that the anticipated social value and positive emotions is a highly important psychological factor for the adoption of crowdshipping. Participants in the study explicitly noted the social dimension of the service such as being part of a network and community as a driving force for participation. A study into motivations for participation in models of sharing economy by Punel et al. (2019) highlights that intrinsic motivations, such as sustainability and enjoyment, play a significant positive role in shaping attitudes. Utilizing social networks and friendships for crowdshipping has also been seen to solve one of the key concerns of customers when it comes to crowdshipping; trust and reliability (Devari et al., 2017; Carbone et al., 2017). However, a study by Punel et al. (2018) finds that the perceived value of cultivating a sense of community amongst participants in a crowdshipping platform is higher for non-users than for those actually using the service. In practice, most growth in crowdshipping doesn’t come from such community-based but from larger businesses looking to “Uberize” last mile logistics by using crowdshipping (McKinnon, 2016). Major retailers have been observed to capture their own network of customers and create an exclusive service (Pourrahmani & Jaller, 2021).

Punel et al. (2019) further concludes that in the case of crowdshipping, extrinsic benefits such as monetary compensation have a negative correlation with using the service. To this, the study

finds that socio-demographics such as age, gender, employment status does impact likelihood of adoption. The most notable outcome of the study is that low-income individuals were shown to be less likely to use crowdshipping, which stands in contrast with many other studies, as the cost-saving opportunity is often accentuated as being one of the major motivations behind participation, and that low-income citizens are more likely to make use of crowdshipping (Tapia et al. 2023; Strulak-Wójcikiewicz & Wagner, 2021; Pourrahmani & Jaller, 2021; Allahviranloo et al. 2019).

This is also true for shippers, where remuneration is considered to be a key determinant for willingness to participate, and that shippers are often students or lower-income full-time employees looking to earn extra income (Pourrahmani & Jaller, 2021). The compensation for individuals has been discussed both in research and by policy makers recently. Research suggests that workers in the gig economy are not always fairly compensated, raising significant social concerns (Pourrahmani & Jaller, 2021). Despite its growing popularity, the gig economy, especially in crowdsourced services, faces increasing scrutiny for its lack of worker benefits such as minimum wage, holiday leave (Piecyk et al., 2021; McKinnon, 2016). Using a gig-economy model can have a negative impact on the brand, but there can also be external forces pushing for changes in worker rights through legal actions as seen with the California Assembly Bill 5 (Pourrahmani & Jaller, 2021).

2.2.6 Managerial implications

For managers, the greatest challenge when launching a crowdshipping model is found to be the ability to scale a crowdshipping platform, and it is not until efficiency has been reached that the positive effects on finances and sustainability become realized (McKinnon, 2016). When it comes to promoting sustainability, managers should promote information pertaining to environmental offsetting and communication and either have customers share in the cost of making deliveries more green, or help them make informed decisions when deciding between services (Biancolin & Rotaris, 2024). When it comes to encouraging and creating incentives to utilize the crowd for deliveries, it is important to understand their individual preferences. Understanding the heterogeneity of the people and their intentions when crowdshipping will increase the probability of acceptance of a delivery request, and increase the satisfaction with the service (Aussiel et al., 2024). To make the initiative profitable, the most important aspect is to maximize the number of parcels that are successfully delivered, and thus the number of accepted and carried out deliveries (Boysen et al. 2022; Aussiel et al., 2024).

Managers must strategically design the platform to reach a critical mass, which is said to be one of the main issues for all crowdsourced activities (Sampaio et al., 2019). For crowdshipping, this means balancing both the sender side and the shipper side and their satisfaction with the service. Alnaggar et al. (2021) creates a list of some decision problems that exist when it comes to the matching and scheduling mechanisms, and how different mechanisms are best implemented for different situations. The authors find that designing a platform with pure self-scheduling for shippers is best suited for deliveries with time windows of an hour or less, but when there is need for a larger shipment or long-haul, having a higher degree of centralization of the decision is better. Furthermore, the analysis finds that much literature on the topic of

crowdsourced deliveries looks into making use of in-store customers to carry out deliveries, but that this is something that hasn't been implemented successfully in practice.

Another empirical study that looks to identify critical factors from a business perspective conducts an interview study with key stakeholders within crowdshipping businesses (Nascimento et al. 2023). The study found a list of parameters that are and arranged them in four categories; behavioral, contextual, service related and technical. The results found that service related factors and contextual factors were most important when designing the platform. Choosing the correct dimensions for the platform is an important tool to design for success, and some such parameters that are important to include is the market conditions, the working conditions, trust and reliability, impact on the environment, society and equity, pricing and payment strategy and the infrastructural requirements (Pourrahmani & Jaller, 2021). A study into contextual factors by Jaller et al. (2023) found that population density and shopping habits significantly affect crowdshipping adoption, with adoption rates varying across cities based on regional transport preferences and vehicle ownership. Topology, weather and seasonality were also found to be limiting factors when looking to implement new technologies for last mile deliveries in cities (Elvas et al., 2023).

Furthermore, a study into the state-of-research in crowdshipping reveals that there are contradictions in where crowdshipping is best implemented, where some argue urban areas because of the greater demand and alleviation to traffic, and others in rural areas because of the long distance trip that being replaced (Pourrahmani & Jaller, 2021). Some studies looking to solve intra-city freight are also evaluating the possibility of integrating freight into public transit, which speaks for a better implementation in urban environments (Bruzzone et al., 2023; Fessler et al., 2022). The question of where is thereby important for managers when looking to implement crowdshipping, since many of the potential benefits are dependent on the fit with the environment as well as the access to a willing crowd.

3. Method and methodology

Qualitative research methods were used to provide data on the topic of crowdshipping and the logistical challenges of a large retailer. In this section, we will outline the research design, the data collection method and analysis method. In addition, we will give an explanation for the chosen methodology.

3.1 Research design

The thesis is structured in three main parts; a literature study, an interview study, and a case study. The literature study was designed to solve the first research question, the interview study provided answers to the second and the third research question was answered by the case study.

3.1.1 Literature study

The literature study was designed according to the process outlined in Table 2 and Table 3.
The process involved conducting a literature search, an initial screening for relevance and assessing quality, extracting the data and then analyzing it (Paré & Kitsiou, 2016). This method for collecting data and analyzing literature is further outlined in section 3.2.1.

Table 2 Paper selection criteria

Items	**Description**
Database	● Researchgate ● Scopus ● Google Scholar ● Springer ● ScienceDirect ● References in articles (snowball sampling) ● Related research (recommendation in database)
Document type	● Peer-reviewed journal articles
Inclusion criteria	● Published in English ● Full text available online for free ● Pass initial scrutiny
Time interval	● 01/01/2015 - 4/4/2024

Table 3 Data collection overview

Database	**Keyword search**
Researchgate	● Crowdshipping ● Crowdsourcing, delivery

	• Crowdsourcing, delivery • Delivery ecommerce • Crowdsourced + last mile + delivery • E-commerce last mile delivery • Logistic, E-commerce, Sustainability
Scopus	• Crowdshipping + last mile
Google Scholar	• Crowdshipping + last mile
Springer	• Peer-to-peer
ScienceDirect	• Crowdshipping • Retail supply chain innovation • E-commerce delivery innovation • retail innovation deliveries

3.1.2 Interview study

The interview study was designed to bring together the perspective of researchers and the perspective of practitioners. This is done through in-depth interviews, ranging from 30 minutes to about an hour. The researchers included in the study were found in research areas such as crowdshipping, urban freight mobility, city logistics, sustainable mobility and human travel behavior. The design of the interview study with researchers is outlined in Table 4. Furthermore, 6 practitioners were interviewed, both employees at a large retailer and employees at crowdshipping businesses. These included four employees within IKEA covering topics such as service fulfillment and service experience from the US, Norway and South Korea, and two stakeholders within crowdshipping businesses, one no longer in business and one that is currently operating. An overview over this is shown in Table 5. The data collection and analysis method for the interview study is further outlined in section 3.2.2.

Table 4 Researcher interview overview

Interviewee	Date (2024)	Time
Researcher 1	29th February	45 min
Researcher 2	6th March	44 min
Researcher 3	8th March	54 min
Researcher 4	11th March	31 min
Researcher 5	15 March	51 min

Table 5 Practitioners interview overview

Database	Keyword search	Time
Practitioner 1	1st March	58 min
Practitioner 2	18th March	39 min
Practitioner 3	20th March	51 min
Practitioner 4	2nd April	45 min
Practitioner 5	10th April	31 min
Practitioner 6	12 April	27 min

3.1.3 Case study

The case study involves data collected through interviews with the case company, and publicly available data about the organization and the market. This is further explained in section 3.2.3 and 3.2.4.

3.2 Data collection and analysis

In this chapter, the data collection process is explained for the four types of data that was gathered for the thesis: research, organizational, market, interview. The analysis method was chosen based on the type of data and its relation to the research question to achieve clear results. In this section, the reason for why an analysis method is chosen is also described.

3.2.1 Research data

Research data that was collected consists of literature, scholarly articles, industry reports, and other academic literature linked to the research topic of crowdshipping and retail logistics management principles. Data for a literature review was collected using a systematic method and synthesizing previous research, which provided an overview of the areas in which research is divergent and interdisciplinary. More specifically, we employed a semi-systematic literature research method to allow for a less narrow search into the concept of crowdshipping and how it is viewed both in academia and as a solution for businesses. Through the use of this approach we could identify patterns and synthesize conclusions about the feasibility of crowdshipping to be used as a solution to the last mile logistic challenges faced by e-commerce companies today (Snyder, 2019).

The analysis of the literature entailed extracting and comparing relevant information from the included studies to synthesize meaningful findings in relation to the research questions (Paré & Kitsiou, 2016). The method for analysis was thematic analysis focused on qualitative overlying themes and patterns. The method for analysis was chosen for its flexibility and ability to be used for identifying recurring patterns and themes in qualitative data such as interview transcripts, and give a deep understanding into participants' perspectives and experiences.

3.2.2 Interview data

Semi-structured interviews were conducted with key stakeholders both within the IKEA organization, but also with prominent figures suitable to provide data to the research topic outside of the organization. The outlines for the topics of the interview were prepared and presented to the interview subject beforehand so as to guarantee their readiness to give answers to the main topics. The interviews were recorded and transcribed. Through making use of this method, valuable perspectives and key factors influencing the decision-making behind adopting crowdshipping could be collected and analyzed. As a guide, the four categories of critical factors from Nascimento et al. (2023) outlines were used to question the interview subjects about which parameters they consider to be most important. These categories include: behavioral, contextual, service related and technical.

The data collected in interviews was analyzed using inductive coding as outlined in Figure 3 containing the following steps:

1. Transcribing the interviews
2. Coding segments from the transcription based on the topic or insights.
3. Grouping comments from an interviewee into larger themes
4. Put all the interview codes together under the common themes.

Using the insights within a theme, a list was compiled in a table in the result. This approach allowed for the narrative or theory to emerge from the raw data itself without being influenced by preconceived notions. This method was chosen because it fit well with exploratory research and thematic analysis with the goal of finding new theories, ideas, or concepts. The themes discovered were used to identify overlying organizational perception and motivations behind decision-making regarding crowdshipping and last mile logistics. The results were also put in relation to findings from the literature study as well as other collected organizational data to be able to understand the context so that the findings could be generalized to answer research question two and three (Delve, 2022). As previously mentioned, insights from the interviews will be used to answer both the second and the third research questions.

Figure 3 Overview of coding method

3.2.3 Organizational data

Organizational data was collected for the analysis of large retailers that exist in two categories. Firstly there is data that is available in the public sphere, secondly there is data that was collected directly from an organization consisting of internal documents. The data was collected either through keyword searches or screening of official websites, or through direct communication with the organization. Both types of data gave insight to operations, practices and strategies, so that the case study was able to provide an overview and empirical evidence to support the research aim and objectives.

Organizational data was analyzed to find underlying motivations and factors that impact decision-making. The data was linked to other thematic findings so that it could be generalized to represent similar retailers and answer research question two. The quantitative panel data that was collected was analyzed to find insights into the state-of-practice for IKEA in the case study on topics such as home deliveries, customer expectations and reviews that could be generalized to also represent larger retailers. The goal was to highlight challenges of last mile deliveries, and the benefits or downsides of implementing crowdshipping.

3.2.4 Market data

The market data utilized in this study was obtained from various sources including industry reports, market research databases, and publicly available information. This included observations such as textual or visual data from various sources, such as industry reports,

market analysis, customer reviews, social media posts, or marketing materials. The goal of this was to map the landscape of the market to discern optimal strategies for retailers looking to leverage crowdshipping in their business.

Market analysis techniques such as trend analysis, and competitive benchmarking were employed to map out the market dynamics and assess the competitive landscape. It was then analyzed to find the current state of the market and its potential which can support strategic decision-making about the objectives of this study.

3.3 Ethical considerations

The report was conducted with consideration to ethical issues, with protection of interviewees integrity and respect for all stakeholders. All interviews have acquired informed consent with voluntary participation and the right to withdraw, with account to any managerial pressure concern for participants. Data has been anonymized to ensure protection of identities, sensitive information, personal data and, ensuring confidentiality. Additionally, only the minimum amount of personal data is gathered to minimize privacy concerns, and when used data is scraped from any personal information, using pseudonyms whenever possible. These measures ensure commitment to upholding scientific and academic integrity throughout the research process, and complying with the European code of conduct for research integrity (ALLEA, 2023).

4. Results

In this chapter, the results of the literature review are presented in the form of tables summarizing the benefits and downfalls in the dimensions economic, environmental and social. This is followed by insights gained from interviews with researchers and practitioners. Finally, the practical implementation of crowdshipping is covered, drawing on findings from both the literature and interviews.

4.1.7 Economical factors

The literature review revealed some economical factors that play into how crowdshipping can be used. Crowdshipping can offer cost-saving benefits for last mile logistics operations by optimizing matching, reducing missed deliveries, and eliminating the need for a dedicated fleet or expensive delivery services. Leveraging a sharing economy model, it provides faster shipment fulfillment through a broad network of potential shippers. Even so, a successful implementation requires investments in development and marketing for scalability, along with addressing reliability and liability issues associated with individual shippers.

Table 6 Summary of the economical benefits and drawbacks

Benefits	
Cost efficiency	Crowdshipping has the potential to significantly reduce the costs associated with last mile logistic fulfillment for retailers. By using a sharing economy model, much previously unused capacity in the form of free time of individuals and spare vehicle space can be leveraged. Consequently, costs are reduced due to a minimization of the need for dedicated fleets for shipments and expensive courier services. Also, utilizing crowdsourced manpower can decrease employee costs. These cost saving aspects can lead to improved profit margins for retailers and potential lower prices for customers. By using various optimizations techniques, aimed at streamlining operations, higher cost efficiency can be achieved enhancing profitability.
Increased utilization	Through crowdshipping retailers have the possibility of increasing utilization by putting unused capacity to work. For instance, many people who travel to and from work are very likely to have additional space in their trunk. Instead, if people would carry one or more items to deliver on the way, people would be able to earn extra cash by driving an already planned trip.
Scalability	Crowdshipping offers a great scalability for their services. This is because it operates a network based model in which the attractiveness of services is increased as more people enter the platform.
Adaptability	An ongoing challenge for businesses is to manage fluctuations in demand for their products. Through crowdshipping businesses

	are able to scale their delivery operations up or down in response to changes in demand very easily and without making heavy investments in infrastructure. This flexibility allows for a more agile and responsive supply chain, which in turn can improve customer satisfaction rates and a competitive advantage.
Drawbacks	
Reliability, quality and efficiency	One primary concern of crowdshipping, or any platform/service that uses a crowdsources model, is the potential of losing reliability and consistency of service quality. This is due to the crowdshippers not being professionals and may lack experience. Consequently, deliveries may adhere to instructions, have variability in delivery times, and less precise fulfillment. These inconsistencies could negatively impact customer satisfaction with delivery services and thus the reputation of the business using crowdshipping for last mile logistics which can have monetary implications. Furthermore, inexperienced shippers have been shown to spend more time driving and parking, as well as driving a longer distance in total, which will result in higher costs due to lower efficiency.
Platform design and creation	Due to crowdshipping being a new innovative solution for last mile fulfillment it requires extensive adaptation from the business point of view. In addition, the business brand may be negatively affected in case of missed deliveries or bad customer experiences with the services. Furthermore, the platform itself costs money to make if developed in-house and places the developer at risk if the platform fails.
Scaling	One of the key activities for crowdshipping to be viable is to continue to expand and scale the service to sustain a larger portion of the demand for deliveries. Growing the number of participants, both customers and shippers requires investment in marketing such as advertising and promotions. Furthermore, a retailer that has created a crowdshipping platform for their exclusive crowd might struggle to gain enough volumes since the demand is limited to their customers. To grow retailers may need to partner with others, incurring additional costs.
Liability and insurance	Furthermore, to maintain a high quality in the service, they must have a function to handle issues with goods. Beyond having to offer this service, they also have to pay for potential damaged or missing goods. If they want to avoid having to pay for such incidents themselves, they can instead decide to have insurance which also infers costs.

4.1.8 Environment factors

The analysis of existing literature also pointed out some environmental factors that affect how crowdshipping can be utilized. Through the use of non-dedicated trips, crowdshipping is found to have several positive effects that can decrease negative externalities from last mile deliveries, specifically by decreasing the number of delivery vehicles on the roads. However, these benefits are dependent on crowdshipping not creating more trips, otherwise it can cause the exact opposite. Therefore, many of the potential benefits of crowdshipping are also potential downfalls, see Table 7.

Table 7 Summary of the environmental benefits and drawbacks

Benefits	
Decrease total vehicle miles	Crowdshipping makes it possible to make use of unutilized capacity of existing transportation resources such as, personal vehicles, bicycles, and public transit. Instead of having many delivery fleets on the road to handle all last mile volume, crowdshipping platforms leverage the spare capacity of already existing trips to fulfill last mile operations. By tapping into this unutilized capacity crowdshipping greatly decreases the total miles traveled in urban environments, consequently reducing vehicle pollution.
Decrease number of vehicles	When utilizing existing capacities and already existing trips, crowdshipping has the potential to decrease the number of vehicles on the road to passenger freight and commuters. This will act to decrease total emissions, alleviate traffic congestion as well as increase parking availability.
Less damage on Infrastructure	The increasing volume of last mile deliveries strains existing infrastructure like roads and bridges. Utilizing crowdshipping via non-dedicated trips and the diverse range of alternative transportation modes it encourages can alleviate this pressure.
Consolidation with multiple packages	Having shippers being able to carry out multiple requests at the same time allows for consolidation of shipments so that multiple deliveries in a neighborhood, or multiple orders from a customer can be delivered simultaneously.
Drawbacks	
Create trips	The potential for crowdshipping to decrease the total number of vehicle miles and number of vehicles used is dependent on only employing non-dedicated trips. However, depending on the type of trip being replaced, employing crowdshipping can lead to increased emissions and traffic congestion. For example, if the trip being replaced with a car was actually a person walking to the store to get their items.

Longer distance traveled per parcel	Inexperienced shippers participating in crowdshipping have been shown to choose less efficient routing than experienced driving, and the extra time spent and distance traveled will have negative externalities.
Lack of optimization	While crowdshipping has the potential to reduce the need for traditional freight providers' large delivery trucks, it lacks the ability to make consolidated and optimized routes. This results in a need for multiple smaller vehicles to make the same number of deliveries. Assuming that the deliveries will each make some additional trip to fulfill the shipments, crowdshipping can in those cases be more inefficient than traditional shipments.
Mode of transport	Drawback of crowdshipping is that one does not know which type of vehicles will be used for crowdshipping purposes, and which type of transport is being replaced. Mode of vehicle for transport ranges from walk, bicycle, electric scooter, regular cars and EVs, and depending on the vehicle and fuel efficiency, emissions can vary.

4.1.9 Social factors

Social factors were also found to play a role in crowdshipping. The potential social benefits of crowdshipping are linked to how working as a shipper is both flexible and has low barriers of entry. It can also create a sense of community between the individuals involved, where people can make valuable connections within their neighborhoods. The downside of crowdshipping is that it is difficult to control, so shippers are at risk of being exploited because of the nature of the industry, as well as the safety of packages and shippers during delivery. See Table 8 for summary of the social benefits and drawbacks.

Table 8 Summary of the social benefits and drawbacks

Benefits	
New flexible work opportunities	Creation of new opportunities for people to earn an additional income. Crowdshipping makes it possible for people of the crowd to easily get an additional job without the need for long application processes and demanding prerequisites. Instead, crowdshipping enables people of the crowd to get an additional income with minimal adaptation which can be important for citizens in low-income classes or with lower education. Also, it offers flexible employment, so that crowdshippers can gain extra money while adapting to their needs and lifestyles.
Social equity	For people that have limited ability to shop for themselves, crowdshipping can contribute to their ability to get a hold of groceries and other necessities. This can be either people in vulnerable positions where visiting a store can be a threat to their

	health such as during the pandemic, or for those who do not have access to vehicles or certain types of goods in their area.
Community engagement	There is a possibility for community engagement and relations to be created through crowdshipping. The encounters between senders, shippers and receivers are all social interactions, making it possible for connections to be established, previously impossible. This can lead to higher trust, a sense of community among people, and cooperation of last mile logistics operations.
Convenience, comfort and safety	Crowdshipping platforms often enable real-time tracking for parcels, similar to what Uber has done with their food and taxi services which increase customer experience by allowing customers to have peace of mind and know exactly where their parcel is at any moment in time. Additionally, through reduction of delivery vehicles and urban traffic, there are some social benefits related to comfort, safety, and security in the city. This includes reducing convection, and longer waiting times for public transport, traffic accidents, and vehicle noise.
Drawbacks	
Security concerns	Crowdshipping raises a multitude of security concerns of the people involved in the platform, particularly regarding the handling and use of personal information and goods. When outsourcing the deliveries to the crowd there is a high reliance on the people performing the deliveries. In case of unethical people, risks include theft, loss of goods, misuse of sensitive data, undermining trust of service and confidence in crowdshipping platforms to handle last mile deliveries.
Regulatory	Crowdshipping currently sits in a gray zone when it comes to the regulatory environment. Without robust regulation there are great uncertainties regarding responsibility for package handling and fair treatment of people involved. Consequently, participants are vulnerable for unfair practices which include unfair wages, lack of insurance, unsafe work conditions. In turn, highlighting the need for some sort of procedures or protective elements for people involved in crowdshipping services.
Exploitation risk	There exists a risk of exploitation of the shippers that choose to pursue crowdshipping for monetary gain. This lies in the informal nature of crowdshipping resulting in uncertain working conditions and fair compensation for work carried out.
Trust and cohesion	Potential drawback of crowdshipping is its effect on community trust and cohesion of service. While traditional courier services are handled by professionals with recognizable brands and accountability structures. Crowdshipping relies on the individual for the oversight and accountability for their services. This can

	lead to lack of community trust and reliability compared to traditional couriers.

4.2 Findings from stakeholder interviews

In total, 5 interviews with researchers and 6 interviews with practitioners were carried out. The interviews with researchers include individuals that have either published work on the topic of crowdshipping or have worked within related fields with knowledge about the topic. The interviews with practitioners include stakeholders in companies offering crowdshipping and with employees at IKEA for the case study.

4.2.1 Interviews with researchers

An overview of some of the insights given by researchers during interviews are found in Table 9.

Table 9 Results from interviews with researchers

Researchers	
Crowdshipping Definition *About crowdshipping as a concept and the different dimensions it includes*	The researchers had worked with crowdshipping for different amounts of years, some recently, some years ago. It was said that the concept of crowdshipping had undergone a major change since the COVID-19 pandemic, which shifted some of the overly enthusiastic idea of crowdshipping solving all last mile related challenges to a more realistic outlook. The basis for this is the realization that crowdshipping is not for everyone, stated in an interview as; *"And I think that we've moved towards a little bit more of a realistic setting that, you know, not everyone, not every passenger and transitor, not every traveler is going to want to carry a package."* Crowdshipping is said to take many different forms, and can range on a spectrum from an Uber gig-model of sourcing from the crowd, to a delivery company with a roster of self-employed contracted drivers. It is also based on the use of technical infrastructure. The mode of transport can vary, including walking, biking, private vehicle transport and public transit. The success of the crowdshipping is often measured towards the trip that is being replaced, but there is a lack of practical data to be sure about the potential.
Business Model *Regarding the parameters and challenges for*	Researchers are united on the fact that one of the pillars of a crowdsourced platform is to reach critical mass, which requires building both the supply and demand side simultaneously, called the chicken-and-egg problem. Many crowdshipping companies are said to struggle with defining their customers and find the

creating a business model around crowdshipping	right niche. They also struggle with retention of customers, because people tend to avoid the inconvenience. *"You have to have enough demand for this, which is not always assured because people kind of try it as a fad and then they don't stick with it if it's not really doing the perfect- fills the perfect performance because people are really picky about how things are delivered."* If you manage to succeed in finding enough people, you also have to be able to monetize the service and make money, and this depends on how you design the business. As a pure matching platform, you might not be able to make money, but if you are providing a service where you take into account liability and responsibility, you can have customer pay. You could also make money on the supply side by offering scooter or vehicle rental to crowdshippers. Because of the difficulty of designing a viable economic business model, crowdshipping is best suited for small companies or startups that can focus on the problem, instead of large corporations that are only driven by monetary gains. The interviews indicated that it is still very difficult for the startups to survive, but if they do, they can sometimes be acquired by the larger firms.

Platform
 	
Includes general insights about designing a crowdshipping platform as well as specific examples of platform mechanisms
	The crowdshipping platform is a complex system that requires a lot of work and in-house competencies. The three main stakeholders to account for are the shipper, the customer and the service provider, and the platform needs to provide them with necessary information. It should be designed to have high ease of use, and could also include elements of gamification to induce use. The researchers chimed in with mechanisms they considered of value to have in a crowdshipping platform which as been summarized as;
	
	● Creating profile/Signing in
	● Vetting; background check, identification verification
	● Messaging; allow conversation between parties
	● Scheduling; shippers putting in planned itineraries
	● Pricing; fixed, bidding, bargaining, tipping
	  ○ Flexible pricing and allowing for messaging can increase the likelihood of complex sensitive, inconvenient or difficult-to-handle goods being carried out that would
	  ○ A bidding model for pricing works better for long distance deliveries, but is too time consuming for shorter deliveries where fixed pricing is better
	● Matching; matching itineraries of shippers with delivery requests, assignment or grabbing mode
	● Information; about pickup time, dropoff time, dimensions

	package ● Handling of payment; per shipment, per period (salary) ○ Shippers prefer getting paid instantly per delivery instead of at the end of the month ● Deposit; penalizing shippers for unfulfilled or badly performed shipments ● Insurance; choose or not choose ● Rating; rating drivers
Adoption *Shows the different factors that plays into adoption of crowdshipping*	For people to accept and adopt the idea of crowdshipping, there are some conditions that need to be met. One major aspect is the value of time and the willingness to accept an inconvenience to deliver something or have something delivered in another way than normal. One interviewer stated: "*We have different priorities in life. We have different value-of-time. We have different lifestyles. We have different ways of shopping*." The value of time and how much time is available can depend on the work status and income, where part-time employees, students or immigrants with less work opportunities and flexible schedules are more likely to participate than someone with a high-paying stable job. One interviewee also stated that an empirical study of a crowdshipping company found that people with specialized vehicles such as handymen had shown great interest in participating. This is beneficial because the vehicle can handle larger packages, and they also have some degree of training to handle shipping, which increases reliability and trust. Trust, or rather, overcome trust issues of having a non-professional handling goods is also a challenge, both for customers and for the retailers sending their orders. Here, researchers stated that the issues with trust had improved recently; *"And with the virtual world, people, we have [that] our trust to others have increased. I go to the other part of the world, an Airbnb from someone and I have never seen them, and I'm going to go and stay in there."*
Participant behavior *Includes travel and shopping behavior, as well as participant view on trust in the platform*	Convincing people in the crowd to participate in a collaborative platform requires understanding their feelings, preferences and concerns. Generally, people were said to value their time and convenience highly, and consider themselves to be time poor. The researchers thereby highlighted the importance of a service being flexible to be integrated in the daily routines of consumers, and that inconvenience needs to be compensated for. Monetary compensation was mentioned as a strong motivation. A researcher had also found empirical evidence of environmental motivations but said that it never really seemed that they truly

	drive the process. An obstacle for people's willingness is trusting a stranger knowing their address and shopping habits. *"It's not necessarily going to be for everyone, and not necessarily everyone will like the idea of a stranger bringing their parcel"*
Contextual *Aspects such as location, regulations external factors that affect and shape the implementation*	The local conditions were said to greatly influence the success of crowdshipping and the shape of the implementation strategy. Based on interviews with multiple researchers, a list of local conditions that influence the implementation has been condensed. These conditions include local travel behavior, transport mode, and purchase size. The location of retailers, whether spread out or clustered, also plays a role. Risk and security levels, such as local crime rates and high-risk areas, are important factors. Regulations and policies influencing responsibility and liability, including the responsibility over transported goods and the safety of couriers, as well as how transporting goods affects vehicle insurance, are crucial. Additionally, regulations and laws that influence employment classification and operations, such as the California Assembly Bill 5, must be considered. Finally, city topography and infrastructure, including the availability of public transit and the location of residential areas, are significant factors. One researcher chimed in on the question about where crowdshipping is best suited; in dense urban environments or in rural areas. *"It seems like urban areas make sense just as the place where you'd be able to maximize your own efficiency to make multiple deliveries in a day or travel just a short distance, although obviously, again, you could add to congestion. So you get into a trade-off between sort of travel time and travel time reliability. If you're going into a rural area, you may have a longer trip, but you might have a more predictable trip than you might in an urban area. So I think that, from that perspective, there's benefits in both ways. Obviously, the distances involved and the potential to probably meet more customers in a shorter amount of time would definitely be higher in an urban area, but I think if you think about it from the perspective of optimizing your overall delivery strategy, it might provide an efficiency benefit if you don't have a truck going out into a rural area and then coming back empty, and a very long empty trip on that back end."* On a larger scale, events such as the pandemic influence society and businesses greatly, such as how the COVID-19 pandemic changed travel and shopping behaviors, preferences to e-commerce and willingness to participate in crowdsourced ideas. The motivations for participating can also vary greatly; are

	they driven by monetary gain, environmental awareness or the possibility for social interactions.
Trip and shipment *About the delivery trip and dimensions of the shipment*	Crowdshipping should be fit into people's routines so as to not induce travel and minimize the detours. One researcher had found that assigning delivery trips instead of having shippers pick them is better to make sure that only non-dedicated trips are used and instead make use of untapped capacity. The efficiency of a trip is also dependent on the mode of transport (walking, car, truck, public transit etc.) and other accompanying technology, and this also affects the externalities. The other major part of the actual shipping is the package. It was said that the size and dimensions of the package is more important than what's inside, especially when getting picked or accepted by shippers, because of the perceived inconvenience. Small, homogenous packages are preferred by shippers, whereas heavy goods require better equipment and expertise, and oftentimes needs to pay more to get picked. When discussing the contents of a shipment one researcher said: *"How do you deal with things that are like protected substances or animals or all these different type of things that people want to ship that maybe, you know, you don't have the right equipment or the vehicle isn't appropriate. How do you deal with all these sort of tensions and attrition that can be coming throughout the line when people are not actually experts, not trained to do this, they don't have professional vehicles and training and skills to do this. "*
Matching & optimization *Regarding the matching process optimizing the shipping activities*	The researchers agreed that another challenge of crowdshipping is matching supply and demand efficiently, because you need to account for things such as the time value, time availability of shippers, the travel time, location and availability of the receiver etc.. All these unknown factors is why optimization becomes extremely difficult, or as one of the researchers put it; *"I don't see this being an optimization problem. And it cannot be. It has to be a behavior problem."* This is why finding a simple match isn't the problem, it is finding willing people on both sides of the equation, or the three sides if you include the retailer. Otherwise the system might fail. There is no universal model that works in every situation, crowdshipping needs to be adapted to local circumstances and variability of participants. One way of increasing the possibility of optimization is to apply crowdshipping in an environment with a lot of demand and supply so that the most efficient routes can be found, for example in urban environments. However, one researcher found that the goal of crowdshipping shouldn't be to optimize;

	"I don't think that it will ever reach because it's not this type of service that will be optimized. I don't think that's the goal. You cannot look into this service with the goal of it being super optimized and the best routes and the greener as possible, I don't think it's possible because you cannot control the commuter."
Impact categories *Includes insights into the three dimensions of sustainability; economical, environmental and social*	There are different types of costs associated with crowdshipping, both economic from investments, but also environmental externalities that incurs societal costs. *"Then there's the sort of the logistics side to things where of course it's a massive operation to fit this into an already quite streamlined business that has huge investments in systems that are already running as they see it quite efficiently. Even though this last mile is definitely the as you probably know, the by far the most expensive part of the delivery chain, both in terms of economics and environmental costs."* On the count of monetary costs, it is stated that crowdshipping can be economically viable. But, it still requires a lot of back-end engineering that smaller retailers cannot afford. There can also be costs associated with liability of damaged or missing goods that grows when the service expands. External costs are described to be dependent on a number of factors, such as whether or not it induces travel or the mode of transport chosen. For crowdshipping to be said to decrease emissions and congestion associated with traditional last mile delivery services, it has to not create more traffic. Also, as a larger retailer, you might have difficulty selling the green aspects of crowdshipping, as one researcher stated that; *"There was a sort of a less goodwill amongst people if they feel like just being used by some large corporation where the focus will be more on sort of these on the monetary aspect. So if focus is more on the green aspects there are more positive associations with participation, which is harder to do if it's coming from a large corporation that then makes this platform with their branding and so on."* There are also social benefits to be achieved through reduction of traffic and saving time for travelers. Crowdshipping also has the angle of creating more interactions between neighbors, which could also have a positive social impact.
Retailer perspective	The researchers that were interviewed had not specifically looked into the perspective of venturing into crowdshipping as a retailer,

Goes into the perspective of a retailer working with crowdshipping	but hypothesized about some of the benefits and downfalls. Firstly, as a retailer you have access to customer data and shopping habits that could be used to prognose demand. As a larger retailer, you can probably sustain demand and supply by yourself, especially if you have multiple stores in the same area and can draw from the same pool of crowdshippers, but as a smaller retailer you might need to consolidate with other retailers. Also, considering the costs and necessary capabilities, crowdshipping might be better suited for larger retailers than smaller, as one researcher stated; *"I think for an individual retailer, that could become a constraint, both in terms of resources, like does the retailer have the ability to run a criminal background check on each customer who's willing to serve as a crowdshipper? I think the cost of that could get extreme, which is why it might not be at the individual retailer level that this model makes the most sense."* They can also integrate crowdshipping in the customer journey online, and with other services such as packaging. Still, crowdshipping should be seen as complementary to traditional delivery services, and might be especially suited for certain types of orders; *"Maybe it can be a core business model for a particular retailer instead of part of their image. But I don't think it will scale to take care of the majority of the enormous amount of things that we keep ordering online and shipping left and right. So I feel like it's a complementary solution for shippers and likely also for retailers."* As a larger retailer that operates on a global scale you also need to consider behavioral aspects such as culture. What works well in one part of the world, might not work in another. In one country, monetary incentives work best to spur participation, but in another, the environmental benefits or social interactions might be a better motivation. The marketing strategy of the crowdshipping service provider thus needs to be fitted to the local conditions. Many retailers today are also focused on the environmental sustainability aspect, which can be difficult to achieve if consumers are not onboard. Giving the consumers enough information to make informed decisions about their delivery will increase their knowledge about the choices they make, which might create a positive feedback loop. As one researcher stated; *"So if I as a consumer I'm forcing this type of request to the retailers they will try to make more changes towards providing the A greener service or providing a different*

	type of delivery for the final consumer.“
Market outlook and comparison *About the crowdshipping market, previous or existing initiatives and how it compares to traditional delivery services*	The market for crowdshipping is volatile and difficult to predict. The industry is still young and plagued by fast changes which puts a lot of companies out of business. It can be expected to only exists as a complement to existing markets; *“One big thing that we learned when we worked with them is that there's enormous fluctuation. I mean, crowdshipping is kind of designed to deal with, you know, surges and demand or sort of like, it sort of picks up the slack from a traditional system.”* *“So I think my overall impression is not that crowdshipping will sort of take over. I think it's still going to be a kind of complementary system to existing heavy-duty shipments that are going on.”* This is because shipment of bulky goods is where most traditional delivery service providers are struggling, and thus where crowdshipping can be competitive. It is difficult to say who will be behind future crowdshipping initiatives, if it’s the established delivery companies expanding their service portfolios, retailers handling their own orders or smaller independent startups launching new platforms, as each has its own advantages and disadvantages. Major parcel carrier companies have more trust from customers, which is important when there are fears of missing or damaged goods. Retailers can utilize their own customer networks, and pay shipped using discounts. Startups have an easier time gathering funds or other types of support, and can be more purely focused on sustainability than the other two. There are also on-demand market players such as Uber that could also branch out into crowdshipping.

4.2.2 Interviews with practitioners

The result of interviews with practitioners including employees at IKEA and stakeholder representatives in crowdshipping platforms, showing the general insights within a theme, see Table 10.

Table 10 Results from interviews with practitioners

Practitioners	
Crowdshipping Definition *About crowdshipping*	Crowdshipping is defined as everyday people delivering items along already planned routes, facilitated through a central platform or organization. This concept requires robust verification processes to ensure affordability, accessibility, and sustainability.

as a concept and the different dimensions it includes	Some key considerations include its availability when needed, its affordability, its alignment with delivery service expectations, and its ability to remain fit for purpose both now and in the future. Crowdshipping implementation can differ significantly from concept to reality due to various complexities, such as the lack of detailed user information and the broad spectrum of potential users, which may include delivery companies. The task of delivery itself is complex, and navigating the digital versus real-life aspects of crowdshipping adds further challenges. *"…we struggled with that constantly, how to keep the concept of making use of existing capacity with the realities out there."*
Business Model *Regarding the parameters and challenges for creating a business model around crowdshipping*	The business model for crowdshipping is centered around providing quick and sustainable deliveries to customers, acting as a complementary service to traditional delivery models. For one practitioners in a crowdshipping platform, their business model was focused on three aspects; *"We thought that we saw that the availability of smartphones and the ability to connect in real time between supply and demand could result in a service that would either make something more convenient, better experience, or more economic."* Matching supply and demand is said to be the most challenging part of crowdshipping, and is the decider between a successful or unsuccessful initiative. Here, it might be beneficial to choose a niche to focus on initially, and then expand from this when you have enough traction. On the customer side where the platform makes its money, it is important to understand the willingness to pay, and what they want to pay for. Price is mentioned as one of the main motivations for customers, and achieving this is based on volume; *"But if we combine the other retailers, we can be like this. Of course, we can provide a cheaper cost to the customers and also that's better for the planet as well. Because they will have multiple transactions towards the similar zip code. "* On the shipper side, it is important to try to keep crowdshipping from turning into a gig-model which has negative connotations for workers. It can thereby be important to have mechanisms in place that makes sure that shippers aren't creating trips to maximize their earnings, but also keeping their working hours lower. To make sure that shippers aren't exhausted, you need a large pool of available workers to draw from.

Platform *Includes general insights about designing a crowdshipping platform as well as specific examples of platform mechanisms*	Development of a crowdshipping platform in which multiple retailers can coexist offer multiple benefits. This type of platform can reach broader audiences and reduce costs for both customers and shippers due to economies of scale. Additionally, to get retailers on board it is essential to highlight the positive externalities of crowdshipping. Economically, investing in an existing platform is likely more cost effective than building one in the long run. *"It's much better if it's crowdshipping among a variety of retailers, the platform would get much more volume and be able to have a much more accessible service."* The intended platform would function similarly to a carpooling service. Users register trips, which are then matched with delivery needs. People can then accept or decline trips, but need to provide identification and bank details in order to register on the platform and to receive payments. Pricing needs to be balanced, dynamic, and competitive. Additionally, the platform needs robust customer support to solve any disputes. *"It was not so easy in the beginning because you need to know what the trips are, what the people are dealing with and so on."* Challenge in running a crowdshipping platform is ensuring that the right people are available for deliveries. The success of the platform requires commitment and cooperation of all stakeholders. This makes running the platform a balancing act to satisfy everyone's needs, and is crucial for implementation and sustaining crowdshipping services.
Participant behavior *Includes travel and shopping behavior, as well as participant view on trust in the platform*	Customers tend to choose home delivery over traveling to get their items, basing their decisions on experience, economics, and convenience. Shippers' incentive to join crowdshipping platforms increases with the volume of deliveries, but there are challenges in ensuring shippers meet customers' expectations. Understanding people's motivations and journeys is crucial to prevent inconveniences and retain them within the platform. However, while monetary gain might be the primary incentive for joining, people tend to stay because of the community and sense of belonging among participants. *"There's actually only three reasons we buy products and services and that's experience, economics, and convenience."* There exist a range of concerns related to the responsibility and trust of the people involved. These issues are related to the fact that shipments are handled by random individuals which may

	lack the necessary competencies to fulfill shipments correctly, hurting the adoption of crowdshipping. Building trust and addressing these issues is vital for successful integration of crowdshipping. Further, ensuring people's initiatives align with the platform's vision and fostering a sense of community can help mitigate some of the challenges, promoting long term success. *"We focus on fostering a sense of belonging, as this community aspect is a crucial element of the sharing economy."*
Contextual *Aspects such as location, regulations external factors that affect and shape the implementation*	*"We are facing different challenges to make it abroad. But now we have a wide set, so we need to understand how to work. What's the road map for those foreign retailers, but you have less points to prove."* Crowdshipping faces significant opportunities and challenges based on geographical differences in prerequisites such as infrastructure, transport modes, and sustainability awareness. Urban environments were said to be more suitable for crowdshipping due to denser populations and better estables transportations networks. Local conditions, including living standards, purchasing power, and shopping behavior, strongly influence customer expectations and service viability, creating need for localization strategies. *"And so the real question is, let's assume that you find a mechanism to satisfy the regulatory that you're somehow, you put in that cost to make sure you pay into the security and all these things."* Implementing crowdshipping is highly dependent on the local circumstances. This includes adapting technologies to align with the specific market and surrounding infrastructure, complying with local legislation and addressing legal implications such as insurance and security. Moreover, markets continue to change and develop which puts additional strain on ventures to be agile and responsive to market dynamics and consumer expectations. *"We were constantly learning about all the intricacies of creating a product that was very, very loved, very appreciated. But ultimately there are realities out there that came into consideration. And then there, that's where the problem started because once we became a service, we had to also provide insurance."*
Trip and shipment *Is about the delivery trip and dimensions of*	Traditional delivery systems rely on dedicated trips to deliver goods to customers. In contrast, crowdshipping can make use of non-dedicated trips, that is already existing trips which a package is brought along. This can increase sustainability, enhance

the shipment	convenience and affordability. *"We wanted to kind of unleash the beauty of the design where people traveling can facilitate the transport of goods for other people."* Since crowdshippers often use their own vehicles, this method is more suitable for specific types of deliveries. The vehicle size dictates the type of goods and the amount of goods that can be delivered using crowdshipping, which makes it more applicable in certain niches. *"The person who is doing the shipping, they are typically using their own vehicles. They're, you know, they're not necessarily a large truck."*
Matching & optimization *Regarding the matching process optimizing the shipping activities*	Crowdshipping has the potential to match shipments with available capacity; *"If you already had somebody going out there, then instead of sending somebody who wasn't planning on going there to make those deliveries. If you had some way to know that this person was already going to be there for whatever other reason, and they could take two of our deliveries so it wasn't adding another vehicle to the road that wasn't optimized."* It is difficult to find exactly matching trips with as little detour as possible which influences the efficiency of the service. To be able to optimize, you need to have sufficient demand on both sides so that you can find the perfect trip, since you cannot control how the trip is then carried out. For this end, it is important for a crowdshipping platform to continuously calculate efficiency of trips to make better matches with the shortest detour possible.
Impact categories *Includes insights into the three dimensions of sustainability; economical, environmental and social*	Crowdshipping offers potential for cost savings for consumers. In addition, having more service providers increases competition and lowers costs and flexibility, as one service provider can cover for another. Though, risk handling and back end data management are costly for platform providers, consequently increasing service fee. *"Delivery companies are constantly looking to reduce costs, because it's a commodity. Everybody's bidding for projects out there with the dreams of this world."* Crowdshipping has potential to be more environmentally friendly in comparison to traditional delivery services. Batching orders in crowdshipping can further enhance sustainability but has yet to be implemented, and enforcing sustainable practices is

	challenging. Moreover, risks of greenwashing and need for closer control over non-employee deliveries complicate the service. *"I think we could have a larger say and impact into sustainability practices, but it is hard for us to really have an accountability factor because of co-employment."* Despite crowdshipping potential, it has not been able to show significant social benefits. Success depends on people's willingness to participate and engage with their community and creating a sense of belonging is crucial for peoples retention with crowdshipping services. Crowdshipping can draw benefits from network effects which can grow services exponentially. Despite this, there are still concerns about exploitation of individuals which can undermine trust and sustainability in the long term, making people quit the platform and decrease adoption. *"There's a big difference between, you know, neighbors helping one another. Hey, do you have any, can I borrow some sugar and or some coffee versus, oh, do you have some coffee for me to buy from you?"*
Market outlook and comparison *About the crowdshipping market, previous or existing initiatives and how it compares to traditional delivery services*	Traditional delivery companies are more limited than crowdshipping, since they only have a limited amount of trucks and shipping volume. On the contrary, crowdshipping theoretically has an infinite pool of workers to draw from, which makes it highly flexible. Traditional service providers are also more expensive, since retailers are generally locked into a contract with one for a longer period of time at a certain price. Crowdshipping is advantageous for moving larger goods as well, according to one interviewed practitioners; *"And the first thing we did was look at the very bulky and hard-to-move items because that was the obvious one. Those are the ones that the traditional, the incumbent delivery solutions providers didn't want to do or were very hard to do. And where we thought we can make a difference."* Both models have difficulties when it comes to control, since neither model allows the retailer to control the workers. Similar platforms on the market that use crowdsourcing such as Airbmb are said to have the same issues. It is also difficult to optimize the routes compared to traditional service providers, since shippers are more autonomous, and the same goes for the level of professionalism in the interaction; *"The meeting in between the customer and the driver is less controlled than in a traditional platform or a traditional TPSP [third party service provider] operation."*

	Generally, the market for crowdshipping has a volatile demand and exists within certain niches, and has to keep up with fast technological changes. Crowdshipping in itself is not sufficiently competitive to take over the delivery market, since it is not sufficiently competitive. Something that crowdshipping does offer, instead, is a more sociable experience according to one practitioner; *"I mean encouraging the system that we want to provide to make it a better world in a way the carbon footprint and the social aspect are. The possibility of connecting with people that live in your community, in your district and your neighborhood and to us, that's great. I mean, again, I don't think that your DHL drivers can do that."*
Customer interaction *Goes into the customer perspective in interactions with crowdshipping and delivery services in general*	*"So I'm monitoring that every week and following up on any surveys, whether they were good or bad, and seeing what things we can work with the provider to do a little bit better to make sure that we're meeting the customer in a good way."* The customer interacts with the company at different stages of the supply chain, and at all of these points of interaction they can be satisfied or dissatisfied. Customer surveys are a good way to find out how these interactions are perceived, having them leave a score or a verbatim. Some important points of interactions listed by practitioners were said to be the interaction between the customer and the shipper at the point of order, and the shipper at the drop-off. Finding out customers' opinions and expectations at these points is important, and should be done both looking at the existing customer base, but also generally on the market to design the service. It is vital for the service provider to realize that the normal ways of interacting can be different across the world, so you need to adapt to local preferences.
Customer value *Gives an overview about what customers are said to value*	During the interviews, it became clear that they are much more focused on the customer value associated with crowdshipping as a service than researchers. Customers were said to value the flexibility of service such as picking between time windows, the level of service and also maybe complementary services such as assembly. Also, they appreciated getting timely updates and being able to check the status of their shipment. A lot of this is centered around convenience, and offering deliveries of goods to home ties into this since it reduces barriers to shop. In addition, more and more customers are said to value sustainable responsibility in companies and their offer, but this is highly dependent on where you are in the world. One practitioners highlights that although people will consider sustainable factors, it is not the main decider;

	"And then people tend to consider that, okay, this company is a good company because they focus more on the ESG. However, this is not the first priority factor as a consumer to decide my decision towards a certain company." Another important thing that customers value greatly, and that might influence their choice of company is trust. Customers are willing to pay a premium for services by a larger established firm with higher security. As a retailer, it can be beneficial to investigate what other similar market players include in their offer, and what customer value in their offerings.
IKEA today *Insights into the current state of IKEA and what they are looking to do*	The IKEA experience today is centered around making a trip to the big blue stores and spending a part of the day, which is tightly coupled with their brand and marketing. Today, they are looking for how the business will continue to evolve, especially through responsible business endeavors. IKEA's main capabilities lies within furniture manufacturing and home furnishing. One employee stated that IKEA struggles with keeping up to technological advances, which might be because IKEA has a tendency of doing things internally. Recently, they seemed to have ventured outside of this way of thinking as one employee said that; *"I mean, based on my experience or history of working with IKEA, we do have a tendency of trying to take these things internally. However, we also have looked, we also have in the past, and TaskRabbit is a good example of that, where we have actually purchased a company, right?"* One example of an internal effort is that IKEA is piloting a new delivery management system in Texas as part of an effort to improve their presence on the US market. Another example is the acquisition of TaskRabbit, which shows how IKEA is trying new ways of improving their service. They have also collaborated with different service providing platforms globally. Currently, IKEA has a one-to-one delivery model where most customers have to travel to the store to purchase their goods and then bring them home. The recent focus on convenience and collaborations with external market players are current efforts in improving these parts of the supply chain.
IKEA vision & strategy *Regarding the vision IKEA has about the*	IKEA has high ambitions when it comes to sustainability, and it is a major part of their decision-making. *"When we design services and buy services and operate services, we tend to come back to three strategic paths*

future and their strategy to achieve it	*that we have in IKEA, which is affordable, accessible and sustainable."* It is said that IKEA is still very customer focused when developing their services, and expects that things will look very different in a couple of years than it does today. One aspect of the customer journey where they are currently looking for improvements is the fulfillment stage, including the last mile deliveries. In the US, IKEA has been looking to increase control over deliveries so that they can optimize and enforce sustainable standards. IKEA is already looking at innovative solutions in their delivery process such as choosing different levels of convenience at different price levels, so that customers have multiple options to choose from. For deliveries, the available options will vary depending on where the customer lives, since the delivery strategy differs depending on distance to the store. Improving this part of the supply chain is an opportunity for IKEA to gain a competitive advantage, which is important for the company to continue moving ahead. When talking about how IKEA copes with changes, one employee said that: *"Things change, and I think if they're not changing, then that's probably worse than if they are."*

4.3 Implementation of Crowdshipping

Implementation of crowdshipping for a retailer is dependent on a number of factors. The following is the result of a case study into IKEA, looking at both their current state and their feasibility to implement crowdshipping. This includes a brief overview of the history of the company, their current state and business model and whether crowdshipping is in line with their strategy and vision. Furthemore, the case study also goes into which method is best suited if IKEA were to enter into the crowdshipping market between developing competencies in-house, making a strategic acquisition or entering into a partnership.

4.3.1 IKEA's organization and logistic strategies

IKEA started as a small mail order company in the countryside of Sweden, but has grown into a multinational furniture and appliances conglomerate that both designs and sells goods (Sweden, 2023). The brand is known to focus on low prices and high accessibility, championing a vision statement that describes their long-term goal "to create a better everyday life for the many people" (IKEA, n.aa). Logistics have always been a central question, and it is from innovation in this area that the famous flatpack furniture was introduced, with the goal to decrease costs and damages during transportation. The logistics poses a particular challenge for the company since much of IKEA's assortment is large furniture pieces, requiring larger vehicles for transportation. The focus on keeping the costs low has remained a pillar in the business since the start, but has in recent years also been accompanied by an emphasis on sustainability (IKEA, n.ab). Within IKEA's circular agenda, they compare reductions to their climate footprint to a baseline set in

2016. Their total climate footprint in 2023 amounts to 3.2 million tonnes of CO2eq. This is a reduction of about 12% from the previous year, and of 22% from the baseline, pointing to how sustainability is embedded into their current strategy (IKEA, 2023a).

The climate footprint is further broken up into each stage of the value chain, and one of these stages is “Customer travel & Home deliveries”. As of 2023, these activities amount to 2.0 million tonnes CO2eq, which is only a 5% decrease from the baseline in 2016. Considering that the goal set for 2030 is to reach a 30% decrease from 2016, it means that there is still a long way to go. However, also found in the report is the breakdown between customer travel and home deliveries. Here, it shows that home deliveries only make up 11% of the total climate footprint for this stage, which has decreased from 20% the year before (IKEA, 2023a; IKEA, 2022). Even so, the current downward trend can be attributed to efforts into increasing the use of EVs and investments in charging points. This is in line with the sub-goal of 100% of customer deliveries and services to be made using electric vehicles as of 2025. However, there exist limitations in the necessary charging infrastructure and the necessary technology, but IKEA is continuously testing new innovative solutions (IKEA, 2023a).

IKEA has tested the concept of crowdsourcing before through initiatives such as Co-Create and IKEA Hackers, allowing customers or students to co-create or modify products. This has allowed IKEA to maintain a focus on innovation, whilst also pursuing their goals of offering low-cost, sustainable products around the world (Cad Crowd, 2023). With 23% of products being sold online in 2023, IKEA, like other retailers, are looking for new solutions to solve issues associated with last mile logistics (IKEA, 2023b). Part of this strategy is also to adopt technologies and methods of deliveries that are best suited to achieving these goals in different countries and regions (IKEA, n.ac). Recognizing the potential for improvement in last mile logistics, IKEA is exploring ways to utilize its existing community to implement crowdshipping. To be able to do this, there needs to be the correct conditions for it. IKEA, having their global reach, has plenty of geographical regions to pick and choose from to find a suitable market for testing new concepts to solve issues with home deliveries. In 2023, IKEA announced a 2.2+ billion dollar investment in the US market, and a part of this investment is to strengthen its fulfillment network to secure better delivery options (IKEA, 2023c).

With 51 stores, 8 planning studios and 18 pick-up locations, the US is the second best selling country for IKEA products (IKEA, n.ad; Statista, 2024f). During 2023, IKEA continued to transform their supply and logistics network, and accomplished close to 6 million truck and parcel deliveries to customers across the nation. As part of the strategy to improve the fulfillment network IKEA US are redesigning the stores to be better integrated in an online customer shopping experience. During FY23, 50% of all deliveries were fulfilled from a store, which is better for speed and efficiency of service (IKEA, 2023d). Figure 4 shows the number of deliveries per service type for FY24 until early April, showing customer preferences. Scheduled doorstep delivery and scheduled in-home delivery are services offered for large items where the customer picks a 4 hour time window for delivery. Standard delivery is the most affordable option for large items under 200lbs (90kg). As a IKEA family member, the starting price for scheduled deliveries is lower than the regular asking price (IKEA, nae).

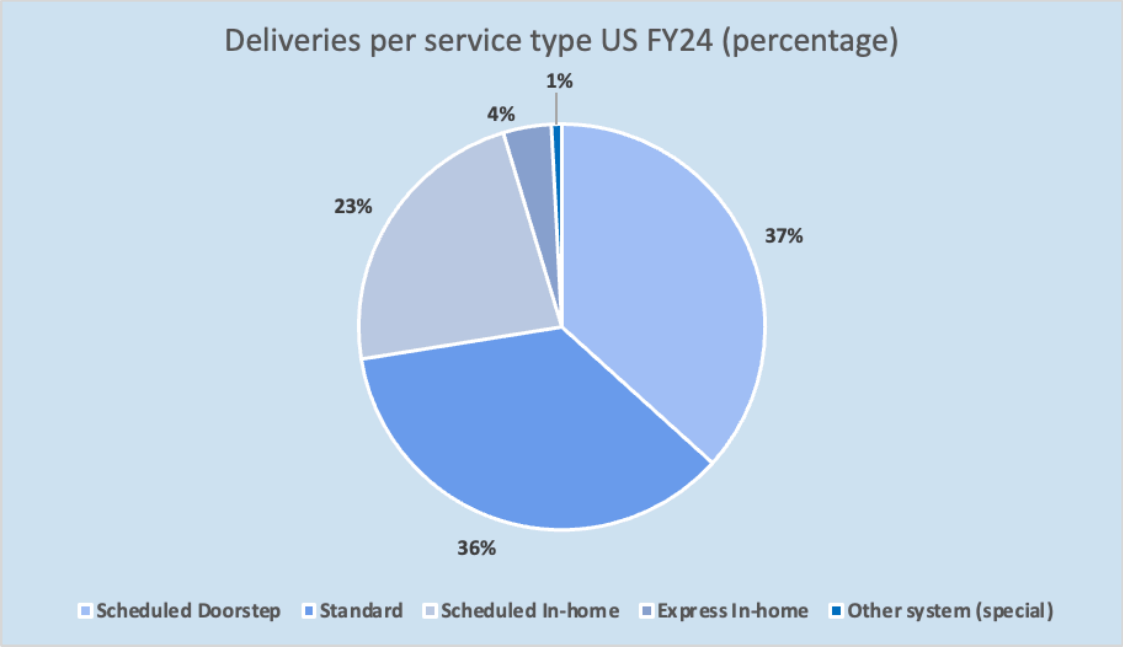

Figure 4 Number of deliveries per service type so far FY24

4.3.2 In-house competencies

IKEA has a lot of necessary competencies in-house to be able to create a crowdshipping platform. One example of this is a new delivery management platform that IKEA has launched in the US to have more visibility into their last mile deliveries. The goal of the platform is to allow IKEA to have more control over the last mile delivery process as compared to before when it was handled by the third party service provider. The goal of the new platform is to enhance the customer experience by increasing knowledge about order status, reducing handling time and failed deliveries and increasing the happy customer score. The new platform internalizes the planning and routing activities associated with the deliveries. One of the main differences from the traditional delivery model is that the pricing model has changed from drop based pricing to effort based pricing. Drop based pricing sets cost per shipping order based on zip codes, and the third party service provider is the price giver. The new effort based pricing is based on parameters such as start and end time, distance, type of service, vehicle and origin etc., and IKEA matches it to one of the competing service providers. The parameters for the delivery are set by IKEA together with the customer who have flexible options when it comes to the required service level and urgency. Beyond IKEA gaining more control over the process and gaining valuable data, the customer also gets increased value from some of the newer functions such as more timely updates to the customer, live tracking and direct communication with IKEA.

4.3.3 TaskRabbit acquisition

In 2017, Ingka Group, a franchise group within the organization, made the acquisition of TaskRabbit. TaskRabbit is an online platform that facilitates on-demand services, allowing users to easily post requests and then choose individuals based on their skills to perform that specific task. The acquisition reflected IKEA's vision of a future characterized by increased convenience, digitalization, and innovation. The acquisitions makes it possible for customers of IKEA to combine their purchase of IKEA furniture with assembly (Ingka group, 2021). However, as of now, the platforms are not integrated. The service is available in the majority of states in the US, but has also expanded into some larger European countries (TaskRabbit, n.aa). TaskRabbit has an extensive network of Taskers (those that perform a service) that can provide more services than assembly, including deliveries. Some of the functionalities of the platform when it comes to deliveries is shown in Appendix A, showcasing the customer journey for a Taskposter (those who post a task). This includes outlining the start and end time for the task and some dimensions of the goods that are to be transported. The platform then shows all available Taskers that have the time and capabilities to carry out the task, and the Taskposter can pick and choose which profile and hourly rates that fits their expectations (TaskRrabbit, n.ab).

The model of having the Taskposter choose between available service providers is recent to the platform. Before, Taskers would bid for a service request and the Taskposter would select the most appropriate one. The new business model instead has the Taskers list their hourly wages and the Taskposter making an informed decision when picking the tasker. The benefits of the new model is increased speed of not having a prolonged bidding process, where the time until task completion has improved from 1 to 3 days to now being completed within 90 minutes of posting. The changes are brought about by the recent shifts in the online economy, where on-demand services are becoming favored by consumers. Instant gratification drives the popularity of platforms like Uber and similar businesses, and transitioning to a real-time platform is a logical step forward also for TaskRabbit. By embracing these changes and recognizing the importance of time to consumers, TaskRabbit can continue to grow (Jain, 2023). Even so, TaskRabbit still struggles with satisfying customer expectations, which is difficult with a lack of control over the quality of how tasks are carried out, and the competence of the tasker. Appendix B shows the spectrum of positive to negative reviews TaskRabbit have received recently on Trustpilot. The platform has an average of 4.3 out of 5.0, which indicates that people are generally satisfied with the service, but that there are issues. The reviews are not limited to delivery tasks and instead represent a variety of tasks performed on the platform (Trustpilot, 2024).

4.3.4 Platform collaboration

The perspective of working with a market player has been evaluated looking specifically at a crowdshipping platform and a pilot they carried out together with IKEA. The analysis of a crowdshipping company is based on publicly available data about the company, but also complemented by information that came up during interviews, both about the company and the pilot study with IKEA.

During the conversations with practitioners, an employee at Nimber was interviewed and gave some background to the platform. Nimber was a crowdshipping platform in Norway that launched in 2012, originally using the name EasyBring. The platform facilitated conversations between customers and the bringer to arrange delivery time and follow up throughout. The idea was to utilize people already traveling somewhere to also deliver packages, which would reduce negative impact on the environment through decreasing the number of trips. visualized in the motto “Going your way, anyway”. However, the goal of the platform was to reduce negative environmental impact by utilizing existing trips, but this proved more challenging than first thought. In reality, the platform was being misused by individuals looking to earn substantial income via deliveries named “superbringers", and commercial businesses hiding behind user profiles marketing their delivery services. Also, the company started running into trouble when they moved to start monetizing their service, because this changed the perception and expectation from customers. After this, Nimber was no longer just a matching platform that facilitated interactions, they were a service provider that needed to take responsibility for the quality of service, and also handle liability issues. In the end, Nimber did not manage to create a sustainable business model and went out of business in 2023.

During interviews with employees from both Nimber and IKEA, the collaboration between the two companies became a topic of discussion. From IKEA’s perspective, their interest was to evaluate the possibility of matching in-store IKEA customers that need assistance to transport larger purchases or multiple items home with other customers nearby that were able to facilitate the transport of the goods for a fee. This was supposed to be both a cost efficient and environmentally friendly solution to last mile deliveries. The pilot took place in Norway in 2020 during 8 days, and consisted of employees from Nimber approaching customers at the register and offering the delivery service, and if accepted, Nimber would deliver it to the customer's home. During the 8 days of the pilot, a total of 43 service tasks which is shown in Figure 5. The pilot did not have the intended outcome because of a number of things, but mainly it was that it didn’t test the concept of crowdshipping as intended. Because of a lack of awareness amongst shoppers at the IKEA, customers could not be matched with each other, and a dedicated delivery trip would be carried out by a Nimber employee. Also, it was unsuccessful at testing the willingness to participate, since the service was offered at such a low price that that became a main motivation. In defense of the initiative, it was mentioned that the service was not integrated in the shopping experience and it was instead handled analog at the checkouts which became disruptive in the customer journey.

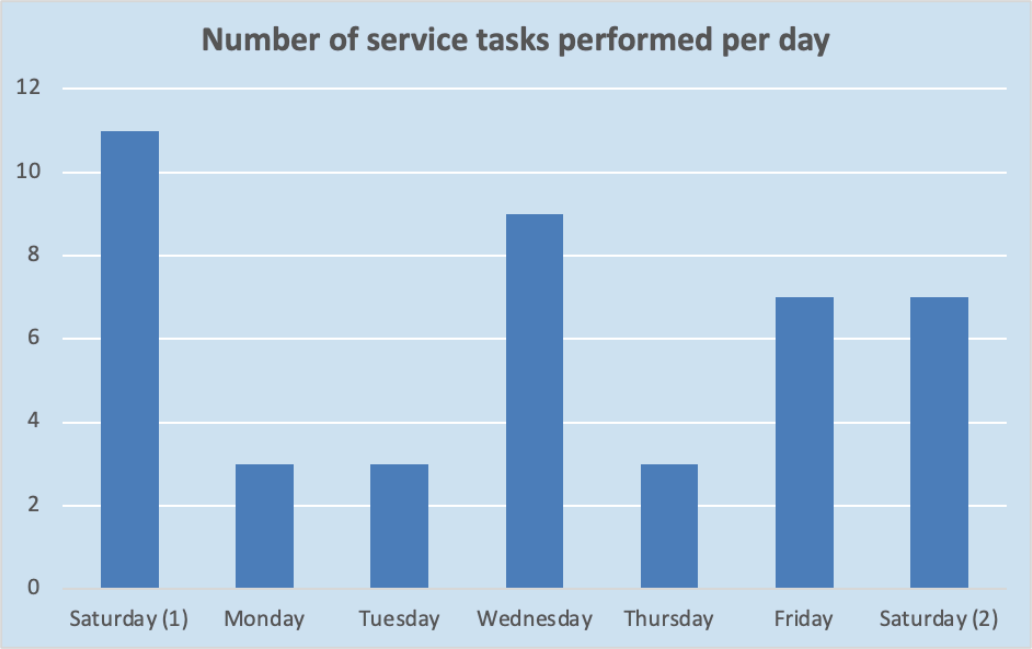

Figure 5 Number of service tasks performed per day, IKEA Norway 2024 (Nimber, 2020)

5. Discussion

This section delves into the analysis and implications of the results, structured into three sections. First, the benefits and drawbacks of crowdshipping to address last mile challenges are analyzed. Second, the key parameters and constraints influencing crowdshipping success are discussed. Finally, the implementation of crowdshipping is examined and put into the context of a retailer through a case study of IKEA. Each part discusses how the findings of the thesis fill existing gaps in research and contribute to the research topic.

5.1 Crowdshipping impact on last mile logistics

The implications of our findings extend from direct use of crowdshipping to last mile logistics in response to the ever growing demand of e-commerce. Our study can be used to make informed strategic decisions for both corporations looking to use crowdshipping as well as policy makers in the e-commerce and logistics sectors. The results suggest that a multifaceted approach is needed to fully understand the concept of crowdshipping since it involves multiple benefits and drawbacks in substantially different categories; economical, environmental and social. Further, the study expands on existing literature by suggesting that benefits of crowdshipping often come with a trade-off in another category. This makes the implementation of crowdshipping a balancing act, only suitable depending on the circumstances of the individual case. The results indicate that crowdshipping can vary greatly in its design, but also who is the platform provider. One might argue that crowdshipping best serves a single large corporation that has access to significant volumes, but that is not always the best case scenario. Crowdshipping also has the potential to be highly beneficial if multiple enterprises, regardless of size, would unite in a shared crowdshipping platform, combining their volumes to reach critical mass in terms of supply and demand. This would make it possible to leverage local couriers for cost effective and environmentally friendly deliveries.

Based on the results of this study, there is still a need for future research to look into aspects surrounding the long-term effects of environmental and social impacts of crowdshipping. The reason that costs isn’t included in this is due to cost being the most direct category to control and something which has been covered by many researchers. The costs are also highly dependent on the current capabilities and resources of the company, and the strategy it chooses for entering into the crowdshipping space. Yet, environmental and social implications have not been explored over time. As the concept matures, the implications are likely to change. From a practical standpoint, platform owners and policy makers should collaborate to establish a framework which accelerates development whilst ensuring protection of the crowd, quality of service, and fair treatment of all stakeholders. Developing standardized guidelines for crowdshipping operations can help adoption of services due to higher trust in platforms as well as address any legal complexities that come from this new delivery model. This will be crucial for unlocking crowdshippings potential to address the last mile logistics challenges in response to e-commerce growth.

5.2 Critical success factors in crowdshipping

Looking more specifically at the implications of the findings, there are some noticeable common themes and contrasts between researchers. When evaluating crowdshipping and its application in society, researchers highlighted the difficulties of achieving the potential benefits, and to a degree, so did the practitioners. A difference is that researchers did so based on the lack of supporting empirical evidence and the many related uncertainties, whereas practitioners did it based on experience or knowledge about customer preferences. Also, there was division within the findings of practitioners. One practitioner from a crowdshipping platform described it as highly unlikely to build a concept centered around sustainability, saying that people only follow the money. In contrast, another stakeholder in a crowdshipping business said that they were successful in maintaining their vision to be environmentally friendly, whilst also achieving a peer-to-peer model based on helping your neighbor. Additionally, the results from the interview study were similar to existing literature, enhancing the credibility of the results of the study.

The other important aspect of the study is to look more into how retailers can implement crowdshipping, which is done by putting findings from interviews in the perspective of a retailer, in addition to a case study with IKEA. Researchers highlighted the fact that retailers have unique insights into customer data to enhance integration. Crowdshipping is said to be better suited for larger retailers with the capability to handle the complexity of running it, such as in-house data scientists, engineers, programmers and human behaviorists. It is also larger retailers, maybe with multiple stores in the same area, that can provide sufficient volumes for delivery services, and has the possibility to draw from their customers as a pool for shippers. One option for this is to use in-store customers to service online orders, which have been tested previously. The practical results of this model of crowdshipping have not had the desired outcomes, in line with the findings in literature (Alnaggar et al., 2021). This speaks to the difficulty of having a successful implementation of crowdshipping even with many of the necessary prerequisites. One reason for this, that was highlighted in the interviews, was that in many cases, traditional service providers are actually a more efficient solution, have better control for optimization, and might be preferred for security concerns by consumers.

It is important to discuss what it means to have a successful implementation, and toward which key performance indicators the success is evaluated. The interviews revealed some interesting perspectives on what it means to be successful. If the goal is to induce a social movement, interactions between peers, and a spirit of helping your neighbor, crowdshipping is said to have an edge on traditional service providers where the interaction is limited. However, if the main goal is to achieve cost efficiency, the potential of crowdshipping is highly dependent on the business model strategy when entering the scene. Building the competencies and platform in-house requires a lot of investment and requires integration with the supply chain upstream, which is something that the literature doesn’t cover. In the same way, environmental sustainability is uncertain when shipments can’t be batched, leading to scenarios where multiple individuals are using their own vehicles instead of one delivery truck, potentially increasing emissions. Enforcing sustainable standards is difficult in general, both when there is co-employment such as in collaboration with third party service providers and when working with free contractors or a gig model as in crowdshipping. When promising sustainability as part of an

incentive there are risks of greenwashing. Overall, the insights from the interviews are an important contribution to the topic since it characterizes many of the constraints and challenges that have previously been unknown uncertainties. In doing so, we have not only expanded the body of knowledge, but also fulfilled the overarching purpose of our study, which was to gain insights into the multifaceted nature of crowdshipping and its implications.

5.3 Leveraging crowdshipping in IKEA case study

These results of the study show that the best method for IKEA to move forward with when implementing crowdshipping, would be to do it via their ownership of TaskRabbit. The interviews and recent investments in a new delivery management platform shows that IKEA wants to move away from the dependence on a third party service provider since it negatively impacts the efficiency and customer value through slower deliveries and updates. Although there are many things that influence customer satisfaction, speed and updated communication were highlighted by the interviewees during the study. They also have prior knowledge of how a collaboration with a crowdshipping platform is a difficult strategy to achieve an environmentally friendly outcome. By working to develop and integrate TaskRabbit into their customer journey, IKEA can regain more control. This makes it possible to enforce their standards such as a focus on sustainability, which is difficult when the service provider is co-employed. This perspective also applies to collaborations with an existing crowdshipping market player, because they will have even less say about free contractors and workers in a gig model.

The difficulty of securing quality of service is still a challenge when moving forward with deliveries through TaskRabbit. Taskrabbit already has the necessary digital infrastructure for deliveries and available Taskers, but they struggle with maintaining the service standard. This is shown in the reviews in Appendix B, and although the service generally is well perceived, there are still occasions when the uncertainty about the competence of the tasker has a negative outcome. Now, through their ownership of TaskRabbit, IKEA can enforce a more rigorous background check, set their own requirements for certain tasks and follow up on incidents. Such insights also pertain to retailers in general looking to implement crowdshipping, since internalization will increase control over performance and quality. However, the more IKEA looks to increase control over the trips and the individuals providing the service, the more difficult it is to achieve the environmental benefits from making use of non-dedicated trips.

When generalizing the results of the case study, the recommendation to make an acquisition needs to be reevaluated. In the case of IKEA, the acquisition of TaskRabbit had already been made, but this will not be the case for many retailers faced with the same decision. The recommendation on which option of entry into the crowdshipping market would have to include comparing the cost of making an acquisition towards costs of developing in-house and maintaining a relationship. Still, the findings about internalizing control through an acquisition will still be relevant for retailers in general. Consequently, the case study is successful in showing how retailers could go about implementing crowdshipping into their last mile deliveries, and how it can be successfully leveraged within the business whilst raising concerns about some of the risks. This combination of the retailer's viewpoint and a practical approach is a valuable addition to the crowdshipping literature.

6. Conclusion

This thesis has contributed to the understanding and researchers of crowdshipping as a solution for last mile logistical challenges within the context of a retailer. It does this by investigating the benefits and drawbacks of crowdshipping, exploring key parameters and constraints affecting its success, and providing insights into how large retailers can implement and leverage crowdshipping within their last mile operations. Through a literature review, benefits and drawbacks for crowdshipping have been put together covering the three dimensions of sustainability; economic, environmental and social. This was done to add to the existing body of knowledge for crowdshipping by summarizing both the positive and negative implications, and making the potential for solving last mile related issues more clear. To find key parameters and constraints for implementation of crowdshipping, interviews with researchers and practitioners were interviewed. The case study with IKEA within the US was used to demonstrate how crowdshipping can be effectively implemented in the setting of a retailer and used as a model for other retailers looking to use crowdshipping.

The first research question aimed to investigate the benefits and drawbacks from using crowdshipping as a solution to address last mile logistics challenges in response to growing e-commerce demand. The scope was set to include economical, environmental, and social implications, with the overall objective of providing valuable insights into the research topic. Our findings of using crowdshipping to address last mile related logistics challenges are consistent with existing literature on many remarks. Studies by Pourrahmani & Jaller (2021) and Tapia et al. (2023) highlight the cost benefits that can be derived from using crowdshipping, reducing delivery costs by leveraging the sharing economy, whilst maintaining the same service level for deliveries. Similarly, research by Mohri et al. (2023) and Jaller et al. (2023) emphasizes how crowdshipping can help reduce negative externalities on the environment and promote sustainable last mile practices, but also include several quality related challenges. However, crowdshipping can in some instances lead to increased costs and negative externalities on the environment depending on if new routes are created and the type of trip being replaced (Cebeci et al., 2023; Tapia et al., 2023). In contrast to the economical and environmental effects, literature put very little emphasis on the social aspects influencing crowdshipping. Our study provided an extension to existing literature by investigating social implications and regulatory challenges associated with crowdshipping, filling a gap in the research space.

The findings from the interview study shows that there are common themes that both researchers and practitioners emphasize as important. These common themes provided a base for identifying the key parameters and constraints, since it combines the scholarly and the real life perspective. The interviews with researchers also nuanced previous works of literature, as they could expand on their research and also lend opinions in other topics than they usually explore. Of especial importance to answer the question was understanding the perspective of retailers. This is found both in the general insights about retailers during the interviews, but also specifically in interview data covering IKEA. Although crowdshipping offers several cost efficiencies and environmental benefits by leveraging the sharing economy, it also experiences a magnitude of challenges in comparison to traditional delivery services with the most prominent

being service quality and ensuring safety for people involved. Reaching critical mass was deemed the most important factor for crowdshipping success but is in itself dependent on multiple factors surrounding the adoption of services. A successful implementation of crowdshipping involves addressing logistical requirements, operational complexities, cost implications, regulatory considerations, and technological dependencies. Through combining the results from interviews with researchers and practitioners, the thesis succeeds in bridging the gap between literature and practice when it comes to implications and challenges of crowdshipping in practice. It also adds to the existing body of knowledge of crowdshipping from the perspective of retailers that have been sparsely investigated previously. When piecing together different scholarly works, a much more uncertain view appears, where the potential for crowdshipping is highly dependent on a number of constraints that are difficult to control.

The third research question of the thesis was answered via the case study into IKEA on the US market. The result includes both publicly available data about the organization and first hand accounts by employees at IKEA about their view of crowdshipping, which adds width and depth to the study. The results showcase that IKEA has made clear strifes towards sustainable solutions throughout their organization, and that they have previous experience working with crowdsourced business models via TaskRabbit for assembly. Furthermore, IKEA is shown to currently focus on improving their last mile in customer fulfillment, and have already made investments to move away from the traditional model and take back control over optimization. This shows that there is a willingness to invest in improvement, an awareness of the difficulties as well as a driving force to reach sustainability that suggest that IKEA could successfully integrate and leverage crowdshipping within their business. The reason for doing it through the ownership of TaskRabbit is that it already has the necessary infrastructure as well as a mass of participants that IKEA can build on to increase awareness and willingness to participate. For retailers in general, this argument also works for collaborating with a market player, if this has an established pool of users.

Through this combination of literature and interviews with researchers and practitioners the study has bridged the gap between theory and practice by providing a comprehensive analysis of the critical factors necessary for crowdshipping implementation. The case study into IKEA also gives practical insights for crowdshipping from the perspective of a retailer. The thesis successfully fulfills the goal of contributing to the understanding and research about crowdshipping as a solution to challenges associated with last mile logistics for retailers.

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8. Appendices

Appendix A

TaskRabbit website service journey

The following list outlines the functionality of the TaskRabbit website for booking a delivery task.

TaskPoster

1. The first step of booking the task is putting in the delivery parameters including:
    a. Input an end address in an area that is covered by TaskRabbit
    b. Choose the type of task
        i. How big is your task?
            1. Small - Est. 1 hr
            2. Medium - Est. 2-3 hrs
            3. Large - Est. 4+ hrs
    c. Vehicle Requirements
        i. Not needed for task
        ii. Task requires a car
        iii. Task requires a truck
    d. Give more details about the task
2. The second step of the booking process is choosing between available service providers. The listed taskers are matched with the previously outlined delivery parameters. Customers can use the following sorting mechanisms and parameters to find the right match for their request:
    a. Sort by
        i. Recommended
        ii. Price (Lowest to Highest)
        iii. Price (Highest to Lowest)
        iv. Positive reviews
        v. Of Completed tasks
    b. Choose task time and price
        i. Time window
            1. Today
            2. Within 3 days
            3. Within a week
            4. Choose Dates
        ii. Time of day
            1. Morning (8am -12pm)
            2. Afternoon (12pm - 5pm)
            3. Evening (5pm - 9:30pm)
            4. Flexible
            5. Specific time (8am - 9:30pm)
        iii. Price range
            1. 10 dollars to 150 dollars per hour

        2. A suggested average hourly rate is listed
    iv. Tasker type
        1. Elite tasker
        2. Great value
3. The third step involved picking the date and time of day for delivery from a schedule that takes into account the availability of the chosen tasker.
    a. Choose an available date in the schedule
    b. Choose an available time during the chosen date
4. The fourth step is the confirmation stage where the customer logs into or creates a TaskRabbit account, as well as inputs payment method.
    a. Confirm your details to get connected with your Tasker.
        i. Create account
        ii. Login to account
    b. Select a payment method
        i. Card
        ii. Google pay

Tasker

The tasker profile includes a page showing an overview of upcoming tasks. This view includes:

c. The name of the Taskposter
d. The type of task requested
e. The time and date for the task
f. The expected earnings upon completion.

Appendix B

Reviews TaskRabbit

Collected from https://www.trustpilot.com/review/taskrabbit.com?page=9&sort=recency&stars=1

Dae and place	Rating	Extract of verbatim
April 2024 US		“Not only did he do an excellent job he was flexible enough in his schedule to do a second job for me.”
April 2024 US		“Installer was very efficient and diligent in his work….”
April 2024 US		“Tasker was fantastic, but all the extra fees added on by taskrabbit were ridiculously high.”
April 2024 US		“All of these taskers keep cancelling last minute…”
April 2024 US		“The task rabbit was underqualified, misled me about his experience and knowledge…”

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