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# Exploring Crowd Logistics Delivery as a last mile delivery solution – the perspectives of multiple stakeholders

**By:**

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A thesis submitted in partial fulfilment of the requirement for the degree of Doctor of Philosophy

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# Declaration

I, Ahmad Alharbi declares that this thesis titled "***Exploring Crowd Logistics Delivery as a last mile delivery solution*– the perspectives of multiple stakeholders**"
has never been submitted anywhere for the award of any degree and all the sources used have been acknowledged.

Signed ...Ahmad Alharbi.....
Date …… 2022……

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# Abstract

The dramatic rise in online purchasing in the last few years has highlighted the importance of the last mile delivery (LMD) task across the globe. However, it faces many economic, social, and environmental challenges (Triple bottom line). This has led to exploring a variety of solutions to develop an efficient last mile delivery system. Amongst them, one rapidly growing innovative solution is Crowd Logistics Delivery (CLD). CLD is assigning a delivery task to a network of individuals who are not employed by the company, that work flexibly as driver full time or part time to deliver goods from point to point. However, up to now, far too little attention has been paid to understanding the multiple perspectives of stakeholders in developing an efficient CLD system. Thus, this study aims to explore CLD in relation to the perspectives of the different stakeholder groups: *institutional*: decision makers, *industrial*: CLD applications owners, logistic service providers' managers, and retailers' owners, and *individual*: customers and drivers/crowd in a rapidly emerging economy – the Kingdom of Saudi Arabia (KSA).

This study uses an inductive qualitative case study approach which would allow exploration of this new topic and provide more flexibility to understand the impact of social and contextual factors. Furthermore, it can provide information richness and a deep understanding of an evolving phenomenon in real-world settings. Besides, there has been little qualitative analysis of this novel topic.

While the findings of this thesis broadly support the work of other studies in this area, it provides new insights that no previous study has offered. Particularly, by exploring its business models, the study shows how CLD is implemented for LMD. This study has identified three different practices of CLD in the context presented by business models: B-to-B-Contract, B-to-C, and C-to-C. It also identified the internal success factors of each business model, including registration, assigning orders, compensation, and the payment model. It further reveals the motivations for stakeholders to use CLD as a last mile delivery solution, such as LMD-related benefits and the social impact on society. In addition, the study has identified the four main challenges CLD faces in last mile delivery that impede its success: legislation, availability of supply/drivers, trust, and culture. These results add to the rapidly expanding field of CLD.

By empirically focussing on the impact of different stakeholders based on their saliency to CLD, the study contributes in several ways to the understanding of CLD and provides a basis to improve CLD as a last mile delivery solution, and particularly in the context of an emerging economy. It also provides a comprehensive study to understand different aspects of CLD and the significant role of stakeholders in shaping the nature and destiny of development initiatives. Furthermore, this study extends the theory in the context of CLD and further extends our understanding of the factors that influence CLD through the stakeholders' involvement. It shows that failing to include the key stakeholders will impact on an organisation's success. Therefore, it shed light on the issues that were captured through involving key stakeholders in

the study. These issues may result from not involving key stakeholders, including drivers' participation limitations, and customers' adoption of a certain business model. It also helped to differentiate between the various understandings of trust, privacy, security, quality, and handling.

# Acknowledgements

I would like to thank everyone who has stood with me during this long journey. Everyone who has offered any kind of help, a word, a smile, academic support, an opinion, criticism, or even gathering and talk. You were the fuel that motivated me and kept me going. I thank you even if you do not see your name below, you are counted and worth it.

To all family members, you are the people in my life that I want to make the proudest of me. All the courage and significance you give me every single day are unparalleled, thank you

To friends who are waiting for my return home with an accomplishment, thank you.

To my uncle, grandfather, and cousin who passed away back home and could not say goodbye, thank you.

To my supervisors for your constant kindness and support before, during, and after, thank you.

To the Management School staff for your professionalism and understanding, thank you.

# Table of Contents

## Tables List:



# Figures List

# Glossary

| Terms | Definition/Explanations |
|---|---|
| Business-to-Business Contract (B-to-B-Contract) | The idea of this business model is based on a contract between an e-commerce or Logistics Service Provider (LSP) company and the CLD provider, where the application provides a channel for drivers to sign up and provide a service. |
| Business-to-Customer (B-to-C) | "Where the customers are the individuals who make the order through the application (business)." |
| Crowd | Any individual that works flexibly as driver full time or part time to deliver goods from point to point |
| Crowd Logistics (CL) | "Outsourcing of logistics services to a mass of actors, supported by a technical infrastructure, in order to achieve economic benefits for all stakeholders" |
| Crowd Logistics Delivery (CLD) | This term combines last mile delivery (LMD) and crowd logistics (CL). The term "last mile delivery" is most relevant to the scope of this research. CLD is assigning a delivery task to a network of individuals who are not employed by the company, that work flexibly as driver full time or part time to deliver goods from point to point. |
| Crowdsourcing Delivery | "Network of individuals who are not employed by the company, that work flexibly as driver full time or part time to deliver goods from point to point" |

| | |
|---|---|
| Customer-to-Customer (C-to-C) | “The business model connects drivers with customers, as direct stakeholders. Then, the driver contacts the customer to make any further arrangements that are needed, such as locations and adjustments to the orders” |
| Customers | Individuals and retailers/restaurants |
| Last Mile Delivery (LMD) | “The activities required for physical delivery to the receiver's chosen final destination” |
| Last Mile Logistics (LML) | “Last mile logistics comprise all types of deliveries and some of its operation: last mile distribution, last mile fulfilment, last mile transport, and last mile delivery |
| Logistics Service Providers (LSPs) | “Outsourcing the logistics services to a third party” |

# Chapter 1: Introduction

## *1.1 Problem statement and introduction of CLD:*

Last mile logistics is an emerging field of research drawing increasing interest from academics and practitioners, especially over the past five years (Olsson et al., 2019). Last mile delivery (LMD) is recognised as the most critical element in the logistics chain of online goods (Boyer et al., 2005, Gevaers et al., 2009). Its importance is rising not only because of its greater size due to the ever-increasing purchase of goods online, but also because online stores are now mainly competing with each other rather than with bricks and mortar stores. Besides the economic challenge, last mile delivery faces issues of increased pollution and congestion (Gately et al., 2015). In the European Union, total goods transport activities amounted to 3.524 billion ton-kilometres, whereas the entire motorised passenger transport activities totalled 6.591 billion passenger-kilometres (Commission, 2014).

A growing body of literature is proposing collaborative and cooperative efforts to address the last mile distribution problem. Individual consumers are exhibiting fluctuating attitudes when it comes to purchasing goods and services for shared, rather than exclusive use. The so-called "sharing economy" is gaining acceptance and popularity, and companies are finding new ways to gain remuneration from shared services (Ohnemus and Perl, 2016). Collaborative alliances in transportation networks are becoming popular among logistics service providers in order to maximise vehicle utilisation and cope with last mile distribution demands at shared costs (Zhang et al., 2017). Successful partnerships could be established between two or more non-competing companies to either share delivery vehicles or jointly operate a logistics distribution system (Tunca and Aboelmaged, 2000).

Consequently, many innovative solutions have been developed to address the last mile delivery problems. One of these is Crowd Logistics Delivery (CLD). Crowd Logistics (CL) has been defined as the "outsourcing of logistics services to a mass of actors, supported by a technical infrastructure, in order to achieve economic benefits for all stakeholders" (Mehmann et al., 2015, p.123). Technical infrastructure refers to a communication medium or information technology platform to coordinate the demand and supply for logistics services (Mehmann et al., 2015). CLD enables the use of spare capacity on planned journeys that are already taking place, thus leading to the improved efficiency of logistics and the reduction of emissions and congestion (Arslan et al., 2019, McInerney et al., 2013, Rougès and Montreuil, 2014,

Mckinnon, 2015, Mckinnon and Bilski, 2015, Mehmann et al., 2015, Chen and Pan, 2016, Paloheimo et al., 2016). Different stakeholders play a major role in shaping how the LMD is performed and managed (Lindawati et al., 2014), but so far little is known about how they perceive and use this innovative solution.

In CL, retailers let individuals cover the last mile for other shoppers (Hübner et al., 2016). The crowd is defined as individuals who choose to undertake the last mile delivery task and the receivers of the items delivered (Rougès and Montreuil, 2014, Mehmann et al., 2015, Frehe et al., 2017, Buldeo Rai et al., 2017, Rześny-Cieplińska and Szmelter-Jarosz, 2019). However, the crowd used in this thesis is defined as any individual that works flexibly as driver full time or part time to deliver goods from point to point.

## *1.2 Rationale for the research*

Despite the previous evidence of the increasing importance of the topic, there is a dearth of literature on the phenomenon of crowd logistics delivery (CLD). This is especially true of empirical evidence on stakeholder preferences due to the potential difficulty in gathering data from a large number of service users as well as analysing complex behavioural aspects of stakeholder decisions (Ghajargar et al., 2016). Factors related to implementation, culture, policy, and the industry as a whole have not been extensively examined (McKinnon, 2016).

While the literature emphasises the need to find solutions to the last mile problem, it pays little attention to examining potential innovative solutions and the perspectives of stakeholders. Logistics actors and networks play a crucial role in the development of Last Mile Logistics (LML) services, but very few studies have focussed on understanding their motivations for using novel LML solutions, with a particular lack of focus on synergies and collaborations that exist among different logistics stakeholders. There is a need for a better understanding of the factors that influence their service preferences, the added value they demand from last mile services, and the capacity of CLD providers to meet these demands. Thus, this research has been driven by ambiguities in the literature concerning the effects of the so-called "sharing economy/collaborative consumption and CLD business models", to investigate the stakeholder benefits from using CLD as an LMD solution.

Despite the increasing interest in CLD, there has been little empirical research with regard to the emergence of CLD as an alternative for traditional LMD. As such, this study aims to provide more insight into the rise of CLD as an LMD solution. This research was driven by the desire to answer several calls from previous researchers. In regard to motives behind choosing

crowd logistics, two studies (Carbone et al., 2017, Punel et al., 2019) highlighted that the purposes for using crowd logistics are unidentified. More research is needed to explore motivations emphasised in the literature, such as trust, openness to innovation, and convenience. Studies should look to shed light on this emerging trend that is fundamentally changing consumer behaviour (Möhlmann, 2015).

There is a similar lack of information about the factors that influence crowd logistics' sustainability, and little is known about how stakeholders view the impact of these factors (Frehe et al., 2017, Rai et al., 2017). In addition, more qualitative and quantitative studies are needed to better understand the business models, barriers and success factors of the new-born actors (business models) in the industry (Rougès and Montreuil, 2014). In a very recent study, (Huang et al., 2020) concluded that crowd logistics research is in general still in its infancy, and research is required on many other aspects of crowd labour, applications, customers, and related businesses to facilitate the sustainable growth of the crowd logistics industry.

## *1.3 The importance of the research:*

A number of CLD applications fail at the proposal stage (Kohler and Nickel, 2017). Moreover, in a review of 106 such initiatives, Quak (2011) found that more than half of these applications failed during implementation. This aligns with the findings from a study by Allen et al. (2012), who stated that only 50 of the 114 initiatives studied were operational. Allen et al. (2012) also mentioned that their practical implementation was prevented by the lack of involvement from the stakeholders.

The behaviour of stakeholders is affected by the variation in their goals and the interactions between stakeholders (Taniguchi et al., 2007). In certain urban logistics projects, the involvement of stakeholders is impacted by legislation. For example, Gonzalez-Feliu et al. (2008) report that restrictive time-based cordon policies for transport carriers within the city have been enforced by local governments in two Dutch cities (Gonzalez-Feliu et al., 2008). The willingness of stakeholders to participate depends on other initiatives, as will be discussed later in this study.

The emergent CLD has sometimes been attached to the phenomenon of 'uberization'. In the current literature, little attention has been given to CLD due to its novelty. Most studies are case-based and conceptual, and address primarily the possible CLD advantages. However, a number of important issues relating to CLD remain unanswered. For instance, (Punel and

Stathopoulos, 2017b) produced a study on the acceptance of crowd logistics by customers in the United States, but it failed to outline factors such as trust, privacy, and culture, that might impact on the customers' decision making on which CLD system to use. With a growing variety and number of LMD strategies or solutions, the literature is fragmented and an in depth understanding of these solutions is needed. Additionally, CLD has gained more interest from both industry and academia following a huge increase in usage in the past few years, as will be shown in the context section 2.6.

To the best of the author's knowledge, no study so far has drawn on empirical data from real world examples to explore from different stakeholders' perspectives the use of CLD as an LMD solution. Furthermore, there is a lack of studies exploring this innovative up-and-coming solution in an emerging economy, where contextual factors might lead to different conclusions from those drawn by studies conducted in a western context. Thus, the study takes place in the context of the Kingdom of Saudi Arabia (KSA), where the use of CLD is increasing dramatically as a last mile solution and even replacing some of the logistic service providers (LSPs) within the city.

This study provides an empirical study of the implications of CLD approaches in an emerging economy. Thus, it contributes to the literature as well as benefiting the overall industry, by providing a comprehensive understanding of the challenges and success factors of CLD as an LMD solution. This research focusses on three research questions.

## *1.4 Research questions (RQs) and research objectives (ROs):*

The literature review revealed that the literature has not yet clearly identified the effects and challenges stakeholders face as a result of implementation of CLD. This thesis focusses on this shortfall in the literature.

**RQ1**: How is crowd logistics delivery (CLD) implemented in the context of the Kingdom of Saudi Arabia?

RO1: To identify the CLD business models

RO2: To identify the stakeholders engaged in different CLD business models

RO3: To explore the limitations of the CLD business models from the perspectives of different stakeholders

RO4: To explore how CLD business models create value for their drivers, thereby making them attractive for use as an LMD solution

RQ1 is the foundation and starting point of this research's exploration of the implementation of CLD and the roles of relevant stakeholders. Hence, RO1 will be the base on which to understand the different uses of CLD for LMD and implementation of products flow paths as represented by different business models.

By answering the first research question, the research will contribute to an increased understanding of the stakeholders' perspectives on the implementation and challenges associated with the different business models of CLD in the context of the Kingdom of Saudi Arabia (KSA).

In terms of creating a sustainable business model, values are required that include benefits and costs to other stakeholders (Bocken et al., 2013). Hence, RQ1 will consider in detail not only the implementation of the CLD business models, but it will also examine the met (common) and unmet (conflicting) stakeholders' interests within the business models that impact their success. This study uses stakeholder theory (Freeman, 1994), and the classification of stakeholders according to the model by (Mitchell et al., 1997). The study will identify the stakeholders of CLD based on their saliency to the business model through legitimacy, power, and urgency. In this study, the stakeholders will be identified and categorised based on the relationship between stake and stakeholder, saliency, and the characteristics of the stakeholder in relation to the CLD business model (Mitchell et al., 1997). Regarding the few studies in the Crowd Logistics (CL) field, the majority of these concentrate on the theoretical arguments surrounding CL. Carbone et al. (2017) clearly describes and categorises various aspects of CL, including CLD (Carbone et al., 2017). While there is currently no consensus on the definition

on a business model (Arend, 2013), Magretta (2002) states that a business model can at least address the following questions: Q1. Who is the client? Q2. What is the customer's added value? Q3. How is the income generated? Q4. What is the economic logic? This study will therefore address the aforementioned questions that were introduced by (Magretta, 2002) to identify the business models and their implementations to answer RQ1 and to meet its objectives. Furthermore, some of the Magretta (2002) questions are used to highlight the differences between different implementations and different business models.

As identified by (Rougès and Montreuil, 2014), more qualitative and quantitative studies are needed to better understand the business models, barriers and success factors of these new-born business models in the industry. Therefore, RQ1 makes a contribution regarding the implementation of CLD, drawing from the different practical cases to understand the advantages and challenges resulting from these implementations. In addition, answering RQ1 will help to identify which implementation of CLD could be the most relevant for the area of KSA according to the stakeholders' expectations and interests.

**RQ2**: Why do stakeholders in different business models use CLD as an LMD solution?

RO5: To explore how potential synergised values among different stakeholders lead to the use of CLD as an LMD solution

RO6: To explore in what ways the stakeholders are motivated towards using CLD as a sustainable LMD solution

After identifying the implementations of CLD and the relevant stakeholders, the second research question addresses the gap in knowledge regarding factors that drive stakeholders to use CLD (Frehe et al., 2017, Carbone et al., 2017, Buldeo Rai et al., 2017, Punel et al., 2019). By answering RQ2 the research uncovers the values and the current factors that influence CLD growth. While the RQ1 provides answers to the implementation, and the met and unmet interests of stakeholders that impact the success of a business model, RQ2 reveals the factors contributing to CLD success as a whole from different stakeholders' perspectives. Furthermore, it considers environmental sustainability as a motivation for stakeholders to use CLD as an LMD solution. The literature indicates that CL is environmentally sustainable and that this is one of the main motivations for using CL in the western context. RQ2 explores the extent to which the stakeholders are motivated towards using CLD for sustainability purposes.

**RQ3**: What challenges do stakeholders face in the successful and sustainable adoption of CLD?

RO7: To explore the current and potential challenges different stakeholder groups face that prevent the development of CLD as an LMD solution

To the best of the author's knowledge, no in-depth empirical study has considered the perspectives of different stakeholders on CLD or explored issues related to industry implications of CLD in general, and for emerging economies in particular. As a whole, this research will establish the essence of CLD implementation and its role as an LMD solution. Enhanced understanding of the answers to those questions will advance the literature, and assist industry to cope with the challenges in developing effective and efficient sustainable LMD solutions. In addition, using stakeholder theory as a lens for the study, RQ3 tries to answer not only the challenges of the delivery issues as unmet interests of stakeholders of CLD as an LMD solution, but also focusses on the silent factors that are not revealed in the CLD literature, such as trust, culture and legislation (Frehe et al., 2017, Punel et al., 2019, Le et al., 2019, Rześny-Cieplińska and Szmelter-Jarosz, 2019, Huang et al., 2020). This study will seek to inform companies struggling with a lack of understanding of stakeholders' expectations so that they can develop customer-centred CLD. Furthermore, it will help improve business models for CLD companies.

The thesis is structured as follows: Chapter 2 discusses the current state of knowledge on last mile delivery and Crowd Logistics and outlines the current gaps in knowledge on this novel topic that provide the motivations for this research. Chapter 3 describes the theory used as a lens of this study. Chapter 4 depicts the methodology and research design. Chapter 5 presents the data analysis and findings. Chapter 6 presents the discussion. Finally, chapter 7 presents the conclusions and recommendations.

# Chapter 2: Literature review

## *2.1 Introduction:*

This chapter provides a critical analysis of the literature on last mile logistics and crowd logistics delivery, combining both traditional and systematic review techniques. It starts with defining the last mile logistics concept and the terms used. It moves on to describe the systematic literature review search methodology, followed by the themes and outcomes of systematic literature review. Next it identifies the gaps found in last mile logistics. Then a systematic review of the crowd logistics literature and traditional literature is presented to highlight the gaps. Figure 1 shows the literature review approach followed to review the relevant literature for the research.

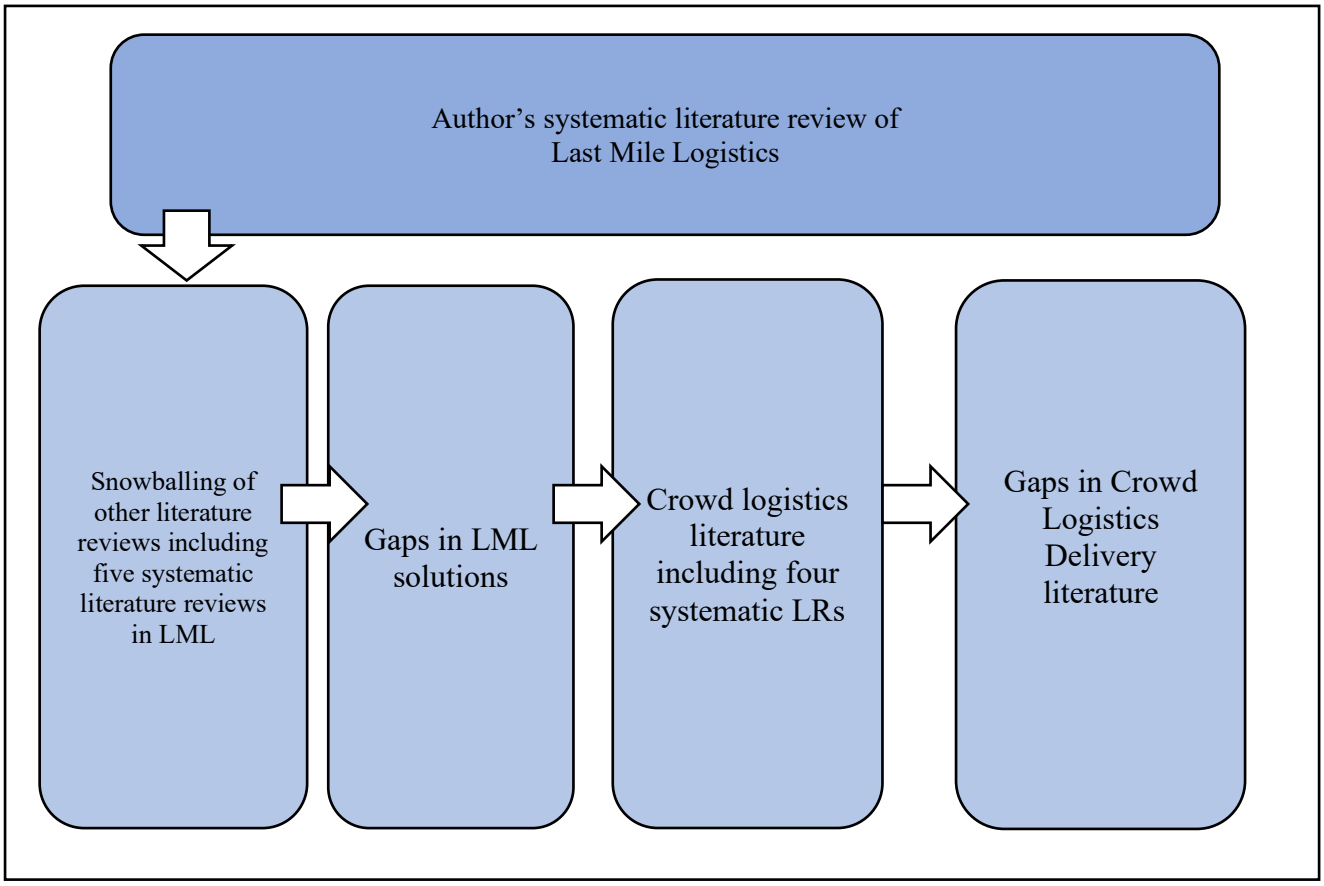


*Figure 1 Literature review approach*

## *2.2 Definition and understanding of Last Mile Logistics (LML)*

Last mile logistics (LML) has attracted the interest of both industry and academia for decades. The first patent for "a method and apparatus for validating credit information during home delivery of orders" was registered in 1991 by Martinez (1993). On the other hand, in academia, the first study exploring the experience of providing home delivery services for groceries was published by Cairns in 1996 (Ghajargar et al., 2016). Cairns (1996) also stated that e-commerce and online shopping have found a market niche owing to the increase in the number of busy professionals with limited time to shop, young people who are comfortable with the use of technology, and those with mobility problems, including the elderly, the disabled, home workers, or those living in remote areas.

Previous studies mostly defined LML as the last phase of the delivery process (Lim et al., 2018). It is a business-to-customer (B2C) model where transactions involve delivery of goods from retailers or distribution centres to the homes or collection points in urban or non-urban areas, where they are received by the customer. In the literature, LML is used to refer to the physical transfer of a material or product from its source, i.e. supply side, to its final destination, i.e. demand side (Ji and Liu, 2011). The culmination of a product's journey from manufacturing to its end-user market is known as the "last mile" in logistics. LML is now a thriving industry, mainly owing to advancements in technology and e-commerce. Online shopping has necessitated direct-to-home deliveries of products purchased on the Internet.

The term "last mile logistics" is vague since the different meanings and scopes found in the literature vary considerably (Olsson et al., 2019). For example, Lim et al. (2015) identified LML after reviewing the following studies: (Esper et al., 2003, Kull et al., 2007, Forman et al., 2009, Gevaers et al., 2009, Gevaers et al., 2011, Lindner, 2011, Ehmke and Mattfeld, 2012), (Wohlrab et al., 2012, Dablanc et al., 2013). "Last-mile logistics is the last stretch of a B2C parcel. It takes place from the order penetration point (i.e. fulfilment centre) to the final consignee's preferred destination point (e.g., home or cluster/collection point), for reception of goods" (Lim et al., 2015, p.2). While this definition includes the delivery from the distribution centre, for example, to the customers' final destination and everything in between, Olsson et al. (2019) found in their systematic review of last mile logistics literature that last mile logistics comprise all types of deliveries and some of its operation. In the literature, the scope of last mile logistics is often defined by a certain form of delivery. In their review, they found that some authors focus solely on deliveries of parcels, while others address other forms of deliveries, such as groceries, and spare parts. Thus, they classified LML into five components

based on a systematic literature review of 155 peer-reviewed articles (Olsson et al., 2019). These components are last mile logistics, last mile distribution, last mile fulfilment, last mile transport, and last mile delivery. Figure 2 shows the five components of last mile logistics.

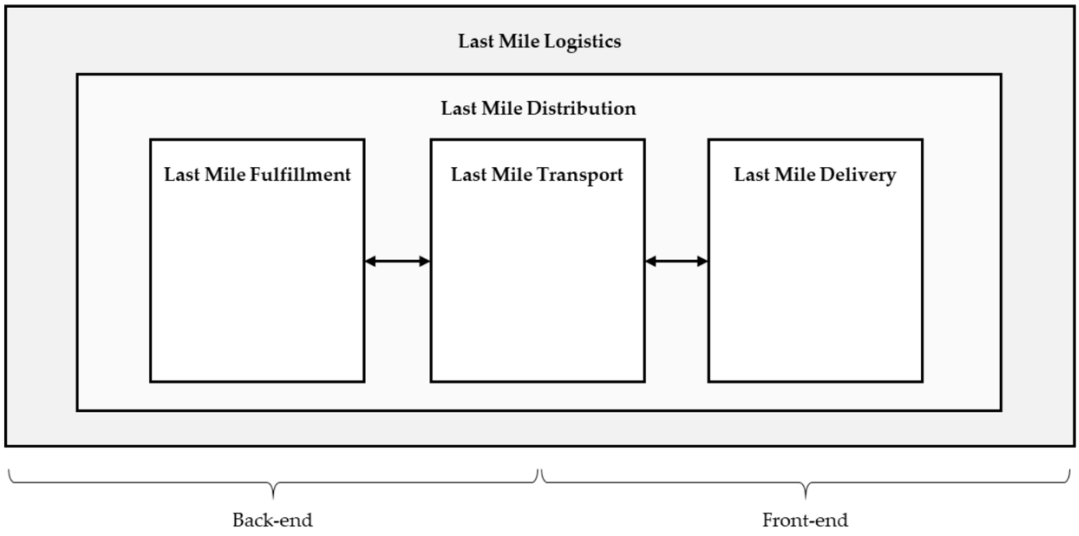


*Figure 2 The five components of last mile logistics adopted from (Olsson et al., 2019, p.10)*

Last mile logistics can be defined as the planning phase, implementation, and efficiency and effectiveness of control of transportation and storage of goods. One of the strategic planning aspects is the use of crowd logistics as a business model for last mile delivery. Whereas last mile distribution is the delivery of the last mile and is concerned with the handling, movement and storage of items across different channels to the point of consumption. Last mile distribution includes more topics, such as route optimisation. While last mile fulfilment is the process of completing an order and getting it ready for delivery. It focusses more on the supply chain structure, such as the logistics supply chain design. Last mile transport relies on the movement of goods which can be achieved by various means, such as vehicles for light goods, heavy goods vehicles, electric vehicles, motorcycles, tricycles, or drones. Finally, last mile delivery refers to the activities required for physical delivery to the receiver's chosen final destination. The front-end, where the last mile reaches the receiver, can also be seen as the last mile delivery. Last mile delivery and last mile transport are closely interrelated and are thus also studied in conjunction (Olsson et al., 2019).

Based on the previous definitions and components, therefore, last mile logistics is an umbrella term covering the previous terms/components including the last mile delivery. Subsequently, from the last mile logistics point of view, crowd logistics is a solution companies adopt to execute the last mile delivery, while from the last mile delivery point of view, the crowd

executes the last phase of the delivery process to the final destination. Thus, the term Crowd Logistics Delivery (CLD) will be used for the rest of the thesis. In that sense, the use of CLD as an LMD solution is the title of the study. CLD is seen as strategy from the LML point of view, while it is seen as an execution method from the LMD point of view.

## *2.3 Systematic Literature Review (SLR)*

### *2.3.1 Introduction*

This chapter details the results of the systematic literature review of studies on LML that was done in 2017. The systematic literature review (SLR) approach was chosen to guide and obtain a better grasp of what has been studied in the subject of LML as well as to identify current gaps in the literature.

The researcher did the SLR, then conducted the empirical work, and continued to review the literature to ensure the work is up to date. According to Siddaway (2014), there are two reasons that lead a researcher not to proceed with conducting an SLR. First, an additional SLR may be unnecessary if other SLRs have answered the researcher's questions. Second, the SLRs considered are of adequate quality and show the gaps in the literature. In the current study, the SLRs were published recently, in 2017, 2018, and 2019 (see focuses and findings of those studies in Table 3), and were able to identify the gaps in the LML literature. However, due to the increase of interest in the topic in both academia and industry and the limitation of the keywords, other literature has been included.

The methodology employed in the systematic review is described in section 2.3.2, the descriptive analysis of the SLR is depicted in section 2.3.3, the current state of LML and the related growing demand, and the themes: challenges and emerging solutions to the problems in LML, will be discussed in the section 2.3.4

### *2.3.2 Search methodology*

The systematic review process adopted in this research was adapted from (Siddaway, 2014) and presented in a flowchart (**Error! Reference source not found.**).

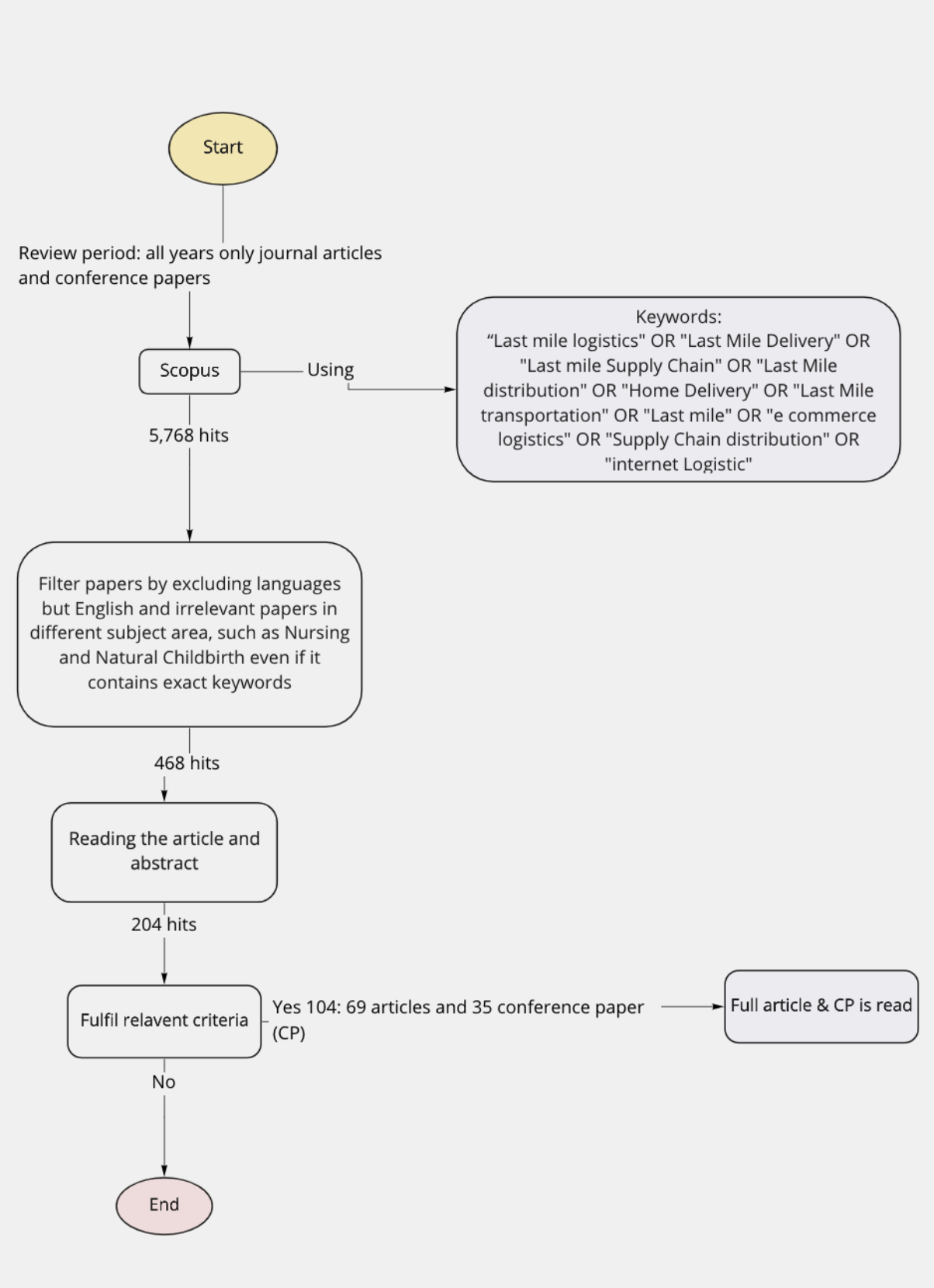


*Figure 3 Flowchart of the systematic literature review process*

The initial search strategy, performed using the Scopus database, consisted of an automated search of published journal articles and conference papers, using a combination of the

keywords in the title, abstract, and keywords. The reason behind including conference papers in this search is that a large number were produced in recent years owing to the popularity of the topic – they also detail the most recent research. Since different concepts, terms, and definitions have been used in the literature on LML, a combination of the keywords was used to cover most of the articles and conference papers. Table 1 below presents the keywords that were used for this initial literature search.

*Table 1 Keyword combinations for literature search*

| Keywords |
| --- |
| **“Last mile logistics" OR "Last Mile Delivery" OR "Last mile Supply Chain" OR "Last Mile distribution" OR "Home Delivery" OR "Last Mile transportation" OR "Last mile" OR "e commerce logistics" OR "Supply Chain distribution" OR "internet Logistic"** |

The automated search generated a total of 5,768 documents. This comprehensive list of research documents was screened by first reviewing the article titles for relevance to the research problem. Documents written in languages other than English were excluded. Articles whose titles contained some of the keywords but were not directly relevant to home delivery or LML, such as nursing or natural childbirth, were excluded. In the case of uncertainty while screening the literature, the reviewer tended towards inclusion (Lim et al., 2015).

The initial screening resulted in 468 articles remaining, which were subsequently reviewed by reading the article abstracts. All articles and papers whose abstracts contained any of the keywords and were deemed relevant to the topic of LML were included. The resulting list contained 204 documents.

The full text of each article/paper was accessed using Google Scholar or StarPlus (university library access) and screened for relevance to the research topic. Research studies whose main problem was not related to the last mile delivery of goods or services (i.e. passenger transport) were excluded. Articles and papers whose full text versions were not accessible via Google Scholar or StarPlus or which required subscription or registration to access were also excluded.

*2.3.3 Descriptive analysis*

A total of 104 studies were analysed for this systematic literature review. The title, abstract, URL, and other pertinent information for each article were recorded using an Excel spreadsheet (Appendix 1). Six of the 104 articles were excluded after the third cycle coding. The majority of the reviewed texts were taken from published journal articles (66%) and conference papers (34%).

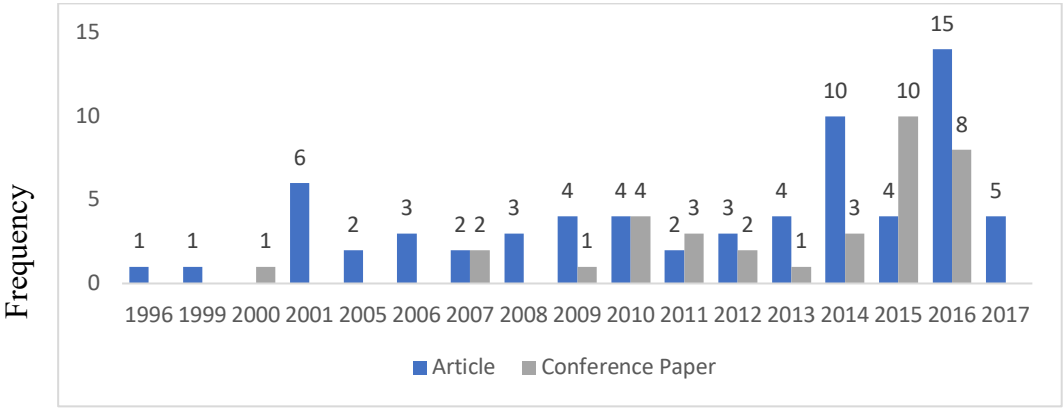


*Figure 4 Types of research documents included in the review over time*

*Keyword usage*

All of the articles included in this systematic review contained at least one keyword "some keywords only" or search term specified in Table 1, either in the article title, abstract, or full text. "E-commerce logistics", "home delivery", and "last mile" were the keywords that most frequently appeared in the keyword lists and titles of the included articles. The majority of the papers reviewed contained at least one keyword combination in the title, while 20% of the included papers had titles that did not contain any of the search terms (Figure 5).

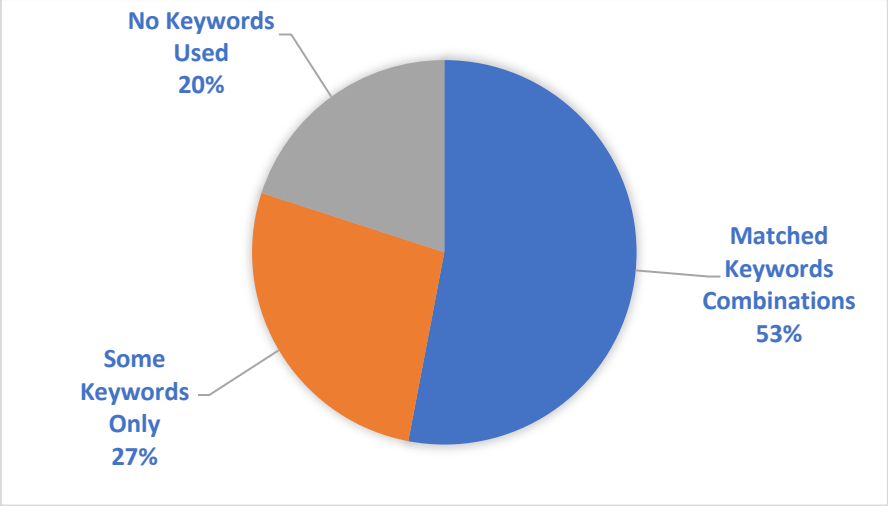


*Figure 5 Keyword usage in the titles of documents*

*Research methods and analytical approaches*

The articles included in this systematic review used quantitative, qualitative, and mixed approaches for data analysis. Quantitative approaches involved the use of various mathematical models and algorithms for determining solutions to specific logistics problems. The optimisation models and decision evaluation tools were used to achieve study objectives, including reducing costs and delivery times, increasing efficiency, comparing logistical options, among others. Some studies used GIS-based modelling to resolve location-allocation and vehicle-routing problems, while others performed computational experiments to determine logistics supply and demand.

Qualitative research methods were used to report issues, challenges, and innovations in LML and home delivery. Some of the articles reviewed used expert interviews, case studies, and document-based data analysis to evaluate the performance of logistics companies, analyse customer behaviour, and assess the social and environmental impact of logistics systems (Bhattacharjya et al., 2016, Hopkins and McCarthy, 2016). Mixed-method approaches were employed by eight studies, i.e. collecting data using surveys, interviews, or focus group discussions and statistical and other quantitative analyses using the data collected.

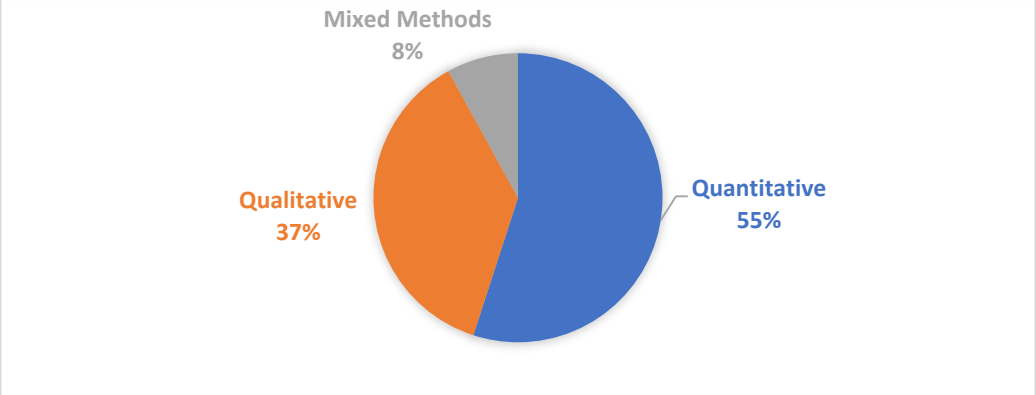


*Figure 6 Research methods used*

*Geographical focus*

Nearly half of the studies reviewed were situated in developed countries in Europe or North America. Most of them analysed logistics scenarios in Germany, France, the United Kingdom, the Netherlands, or the USA. A small number of studies were set in other European countries: Belgium, Finland, Sweden, Italy, Greece, Spain, and Portugal. Some studies also looked into regions further east, particularly Japan and New Zealand. On the other hand, around 20% of the included articles were concerned with developing nations. Many of these explored the situation of LML in China, Taiwan, and Singapore. The remainder of the studies were either applicable to both or too general to classify into either category.

It was observed that the studies set in developing countries were focussed on the last mile delivery of food, medicine, or small household appliances to retail customers in rural communities or in the informal or low-income sectors. Humanitarian logistics is another recurring theme in developing countries, where last mile distribution systems are being developed to address problems such as disaster relief, urban congestion, and poor infrastructure and information technology. The home delivery schemes studied in developing countries were those of the retailing platform, including, but not limited to, express and parcel deliveries. In contrast, research conducted in more developed countries was mostly concerned with improving efficiency, through collaboration and consolidation within the supply chain or by employing technology-based systems, such as in e-commerce logistics. The evaluation of innovative, integrated, and inter-modal logistics systems is a common theme in these studies as is the assessment of environmental sustainability alongside economic performance (Appendix one).

### *2.3.4 Themes arising from the review:*

Thematic analysis was carried out to identify themes by following the approach of (Wilding et al., 2012). The researcher started with first cycle coding then reread the articles for second and third cycle coding before grouping the codes into themes. The themes were assessed using triangulation through multiple analysts/perspectives. There are four types of triangulation contributing to the verification and validation of the qualitative analysis: methods triangulation, triangulation of sources, theory triangulation, and analyst triangulation (Patton, 1999). Analyst triangulation is where the researcher uses multiple analysts to reduce potential bias. Thus, in this research analyst triangulation was carried out by using multiple analysts (supervisory team) for the thematic analysis to reduce potential bias.

The analysis resulted in two main themes: challenges and solutions. These two themes and their respective subthemes, along with the code cycles are presented in Figure 7*,* which shows the analysis sample table used in the spreadsheet. Table 2 shows how the researcher categorised the codes into these two themes.

The challenges theme refers to articles focussing on emergent issues in LML/D. Those challenges depict the complexity of LML/D. The solutions theme, on the other hand, refers to articles that focus on the technological, innovative, and new solutions to current or future LML/D issues

*Table 2 Emergent codes and themes*

| **Theme**<br>**Challenges** |
|---|
| **Codes:** |
| ***Route optimisation:***<br>(Weigel and Cao, 1999, Campbell and Savelsbergh, 2005, Agatz et al., 2011, Zhang et al., 2011, Martínez a<br>Rennemo et al., 2014, Genta and Muñoz, 2007, Campbell and Savelsbergh, 2006, Muñuzuri et al., 2009, Muí<br>et al., 2015, Nguyen et al., 2015, Hayel et al., 2016)<br>**Total:14** |
| ***Cost and efficiency:***<br>(Lin and Yu, 2007, Domingues et al., 2015, Xu et al., 2015, Gan et al., 2009, Ge and Gan, 2009, Hostetler, 2<br>**Total:5** |
| ***Legislations and policies:***<br>(Moseley and Owen, 2008, Chen et al., 2017b)<br>**Total: 2** |
| ***Environmental and sustainability issues:***<br>(Mangiaracina et al., 2015, Handoko et al., 2016, López and Ferrándiz, 2016, Nathnail et al., 2016)<br>**Total: 4** |

| |
|---|
| ***Urban settings:*** |
| (Dablanc et al., 2013, Chen et al., 2017b) |
| **Total: 2** |
| ***Service quality and customers' demands:*** |
| (Chou and Lu, 2009, Hsu et al., 2010, Xing et al., 2010, Chen et al., 2011, Chen et al., 2012, Lang and Bresso |
| 1996, Bhattacharjya et al., 2016, Lim et al., 2017, Shao et al., 2012, Huang et al., 2010, Ito, 2015, Jasial et a |
| **Total: 14** |
| ***E-commerce focus challenges and Omni channels:*** |
| (Yu et al., 2016, Hübner et al., 2016, Xu and Huang, 2017, Ghezzi et al., 2012, Lee and Whang, 2001, Yang |
| **Total: 7** |
| ***Rural settings and emerging economies:*** |
| (Moseley and Owen, 2008, Coetzer and Pascarel, 2014, Rao and Murthy, 2014, Cheng, 2015, Wang et al., 20 |
| Parente, 2014) |
| **Total: 7** |
| ***Unattended home deliveries:*** |
| (Punakivi and Saranen, 2001, Goethals et al., 2012) |
| **Total: 2** |
| ***Humanitarian Logistics:*** |
| (Battini et al., 2014, Das and Hanaoka, 2014, Sodhi and Tang, 2014, Gil and McNeil, 2015, Ahmadi et al., 2 |
| **Total: 5** |

| |
|---|
| ***Cold Chain:*** |
| (Singh et al., 2016) |
| ***Total: 1*** |
| ***Total articles on complexity:63*** |

| **Theme**<br>**Solutions** |
|---|
| **Codes:** |
| ***3D printing*** |
| (McKinnon, 2016) |
| **Total: 1** |
| ***Reception box, Pick up points/shared delivery points:*** |
| (Kämäräinen et al., 2001, Punakivi et al., 2001, Weltevreden, 2008, Feliu et al., 2012, Zhang and Lee, 2016, |
| **Total: 6** |
| ***Home Delivery as a beneficial solution:*** |
| (Cairns, 2005, Murphy, 2007, Potts, 2008, Myers, 2009, Edwards et al., 2010, Starkey, 2010, Tunca and Abo |
| **Total: 8** |

| |
|---|
| ***Automated vehicle/system/electrical vehicle and mobile depot:*** |
| (Ohnemus and Perl, 2016, Galonske et al., 2016, Verlinde et al., 2014, Dettenbach and Ubber, 2015) |
| **Total: 4** |
| ***Crowd Logistics/orders sharing and collaboration solutions:*** |
| (Lindawati et al., 2014, Handoko and Lau, 2015, Wang et al., 2016b, Park et al., 2016, Frehe et al., 2017, Z |
| 2014) |
| **Total: 7** |
| ***Physical Internet, Internet of things and ICT:*** |
| (Petrovic et al., 2013, Schau et al., 2015, Venkatadri et al., 2016, Hao and Zhang, 2010) |
| **Total: 4** |
| ***Trending and future solutions:*** |
| (Hopkins and McCarthy, 2016, Ghajargar et al., 2016, Arvidsson et al., 2016, Cossu, 2016, Clausen et al., 20 |
| **Total: 5** |
| ***Total articles on solutions: 35*** |
| ***Total Articles: 98*** |

| Year | Title | First cycle coding | Second cycle coding | Sub-theme | Theme |
|---|---|---|---|---|---|
| 2009 | Home delivery at the Orange County Library System: An exemplar from the USA | LMD benefits of saving emission | Benefits of LMD | HD as a beneficial solution | Solutions |
| 2009 | Modeling freight delivery flows: Missing link of urban transport analysis | Delivery flow issue | Complexity deals with routing and inefficiency | Routing Optimisation | Challenges |
| 2010 | Using Cusp catastrophe theory to model pick-up point choice behavior for online bookstore shopper | Pick up point option in LMD | Service quality and customers' demands | Service quality | Challenges |
| 2010 | Applying loss aversion to investigate Service quality and customers' demands in logistics: A moderating effect of service | Customer loyalty in LMD linkage with service quality | Service quality and customers' demands | Service quality | Challenges |
| 2010 | Determining package locations for delivery constrained truck loading utilizing shelves | Packages sizes and utilisation | Efficiency related issue while distributing | Cost and efficiency | Challenges |

*Figure 7 Codes to themes sample process*

The next section depicts the challenges of last mile logistics identified in the literature from different perspectives of the LML/D context. Specifically, it will discuss the main challenges that were identified as relevant to the current study, such as cost, urban settings, rural settings, less developed economies, and consumer demands.

Section 2.3.4.2 moves on to discuss the solutions in the literature that are shown in the same list in Table 4. After that, the gaps that were found in the authors' systematic literature reviews and other literatures including systematic literature reviews will be discussed. Next, the crowd sourcing and crowd logistics literature and gaps will be discussed.

*2.3.4.1 Challenges:*

This section attempts to identify the subthemes that reflect the challenges encountered by providers of LML services, particularly those pertaining to the cost, the complexity in urban, rural and less developed economies, and end-users of the last mile service.

*Challenges section overview*

Successful last mile delivery requires meticulous planning of the ordering, distribution, and delivery networks for goods and services. The potential to meet future online shopping demand relies on the ability of LML service providers to provide efficient and reliable services. The challenge to LML service providers is how to cope with the growing volume and complexity of last mile deliveries (Chen et al., 2017b). Logistics companies are plagued with problems related to last mile delivery, which include extremely varied transportation requirements and customer demands, limitations of service delivery vehicles and traffic congestion, the high unit cost of transporting goods to individual customers, responsiveness of automated order-taking and inventory systems, and the stiff competition within the LML industry (López and Ferrándiz, 2016). Vehicle routing problems, time windows for delivery, the need to make numerous trips owing to limited transportation resources, and other product loading issues are the issues faced by any home delivery service company at any given time (Martínez and Amaya, 2013).

Cost

Cost and speed are two significant factors for the success of last mile delivery (Chen and Pan, 2016). As an online retailer grows, faster delivery to its customers will become an increasing competitive advantage. The cost of LML may be the largest cost of the total supply chain cost (Devari, 2016). The establishment and operation of a centralised distribution centre, for

example, to fulfil online orders, requires significant capital investment, which can only be justified by high-volume orders (Lang and Bressolles, 2013).

Home delivery is one of the most critical cost drivers in the e-commerce sector. Product distribution across the supply chain significantly affects a logistics company's bottom line. As the number of shipments increases, the cost of delivery increases as well (Ge and Gan, 2009). Cost drivers in e-commerce logistics include the type of reception (i.e. attended or unattended home delivery), the size and weight of products to be delivered, transport requirements of products to be delivered (e.g. cold storage), the complexity of the ordering process, and the length of delivery time windows (Lin and Yu, 2007). Additionally, there are variable costs associated with the handling and dispatch of product shipments, which impact the total logistics costs, such as costs related to returns or failed deliveries (Venkatadri et al., 2016). A good example is the cost incurred in the case of returns. Most retailers offer customers a money-back guarantee or refund if they are unsatisfied with the product. When purchasing products online, customers do not get to see, feel, or test the products before buying (Hübner et al., 2016). In some cases, customers are not entirely happy with the product once they receive it and will opt to return and get a refund. While the cost of returning the product will fall on the customer, the retailer will have already incurred a cost for the delivery of the product, which in retrospect was not purchased at all. Product returns is a major problem in e-commerce since return rates for online sales channels are higher than those for in-store sales channels (Lang and Bressolles, 2013).

The cost incurred in the case of failed home deliveries is another source of variable costs. Starkey (2010) found that more than 75% of consumers have experienced delivery failure, such as their not being home to accept or sign for the goods delivered (Starkey, 2010). This high rate of failed deliveries thus shows that last mile operations represent a risky and costly venture for private companies, particularly providers zeroing in on cost recovery (Cheng, 2015).

In order to reduce operating costs in LML, research studies (Punakivi and Saranen, 2001, Kämäräinen et al., 2001, Xu et al., 2015, Hayel et al., 2016, Hostetler, 2010) looked into the cost structure of companies offering LML services and proposed various models to help the actors involved in LML limit their operating costs. For instance, a common recommendation for improving cost efficiency is that of establishing integrated logistics chains where costs can be shared between e-commerce players and third-party logistics providers (Xu et al., 2015). Optimising the packing sequences and improving the ease of loading and unloading packages during last mile deliveries is another way to cut back on logistics costs. This allows cargo

facilities to maximise loading spaces and accommodate greater product volume while making packages easily accessible upon reaching the delivery destination, thus enabling them to save on operating time and labour cost (Hostetler, 2010) . LML providers can also minimise costs by offering several delivery options to customers, such as having a product delivered to their home or to a pick-up station (Hayel et al., 2016). It is important for LML companies to minimise their costs so that they can offer users more affordable prices for their services (Kämäräinen et al., 2001). At the same time, home delivery service providers need to understand the variables affecting the cost implications of the services they provide in order to grow into a profitable logistics enterprise (Punakivi and Saranen, 2001).

The logistic challenges manifested in e-commerce business transactions are distinct from the problems encountered in offline channels. Developing a logistics strategy for the last mile is highly complex because of the wide range of variables that need to be considered.

E-commerce companies offering a diverse array of products necessitate a more complex procurement and inventory management system. Delivering groceries, for example, is drastically different from delivering items of clothing. The suppliers and distribution centres servicing these products are independent of each other and are likely to be found in separate locations. The average number of items ordered in an e-grocery store can be up to 60 times higher than an online order for non-food items, resulting in complicated picking and packing procedures (Hübner et al., 2016). Consolidating freights of different types from various sources is challenging. Large freight volumes, particularly those headed to populated urban and commercial districts, entail complex vehicle routing and scheduling plans (Nguyen et al., 2015).

Certain products may likewise have specific requirements, such as controlled temperature and humidity, which need to be maintained until the last mile delivery. Cold chain logistics, for instance, is made even more complex by the need to transport products with varying shelf life (Singh et al., 2016). Fast-moving consumer goods are products that consumers consume within a short period of time and purchase repeatedly, thereby enjoying continuous high demand. Consequently, the fast consumption and resulting demand for such products make the forecasting of their consumption, production, and distribution all the more difficult (Zhang et al., 2011). Products with shorter life cycles or those that depreciate easily should be prioritised in last mile deliveries as compared to those products with minimal risk of obsolescence (Ghezzi et al., 2012).

Given the inherent complexity of LML, the existing research offered a number of solutions to help manage these problems. Some approaches focus on improving the flow of information along the different logistics processes, for example, with the use of mobile devices and applications to enhance management communication (Petrovic et al., 2013). Emerging technologies such as bar coding, radio frequency identification (RFID), and electronic product codes (EPC) are some of the ways in which labour-intensive processes (i.e. product inventory) can be automated (Hao and Zhang, 2010). The use of wireless communication systems and electronic data can streamline the identification and tracking of commodities in logistics processes, where various types of goods, containers, and vehicles can be efficiently and accurately monitored.

Urban settings

Urban areas are critical endpoints for any LML operation. The population density in cities and urban areas is high, and the customers that LML providers are trying to serve are in close proximity to each other. A significant number of commercial enterprises requiring LML are likewise situated in urban areas. Although cities are a desirable location for LML operations, certain logistic challenges present themselves in urban settings.

The term "city logistics" refers to the process of optimising logistics and transport activities in urban areas while considering the traffic environment, traffic congestion, and energy consumption in the local city economy (Nathnail et al., 2016, Taniguchi et al., 1999). The growing demand for last mile delivery services places an increasing burden on cities and urban communities. Traffic congestion, air and noise pollution, vehicular accidents, and parking problems are some of the externalities of LML in metropolitan areas. In addition, large delivery trucks damage roads and increase road capacity demands (Dablanc et al., 2013).

Online transactions have led to the need for individual and personalised delivery of goods and services to urban clients. With urban customers expecting efficient and reliable LML services, logistics companies have to deal with the challenges of limited time windows for deliveries, high traffic volumes, especially during rush hours, and parking restrictions, among other problems (Muñuzuri et al., 2009). LML service providers need to plan and execute optimal delivery routes and schedules in order to address their clients' logistics requirements at a reasonable cost. Complicating the situation further is the uncertainty of travel time along

congested city roads, which may cause delays and lead to additional costs to delivery companies (Köster et al., 2015).

Metropolitan areas are looking for logistics solutions for transporting and moving goods, services, and people up to the last mile. Current studies point out the best practices in LML and promising options for better managing urban logistics so as to reduce its impact on city populations. Strategies explored include vehicle routing models, alternative transport, consolidated deliveries, and various forms of partnerships and collaboration among logistics stakeholders. Other possibilities include environment certification programmes, land use and transportation policies, and compliance to incentive-based and voluntary standards (Dablanc et al., 2013). There are also recommendations on changing policies and regulations, for example in terms of parking availability (Chen et al., 2017b), use of electric vehicles (Edwards et al., 2010), off-peak deliveries, and freight vehicle flows (Muñuzuri et al., 2009). Such changes are necessary if the demands for last mile delivery are to be met while maintaining a clear environmental advantage in urban settings.

Rural settings

LML is operated differently in rural areas as compared to city settings. The main challenges here are the limitation in terms of available logistics facilities, the accessibility (in terms of distance or travel time) of last mile users, and the quality of services offered by local logistics operators.

A case study on transportation supply and demand in El Paso showed that the limited transportation facilities in rural areas fail to satisfy the needs of people living in these areas (Chandra et al., 2016). In rural England, limited access to logistics services compels people to settle for deficient service, which tends to be easily accessible, as opposed to getting higher service quality from a provider located elsewhere (Moseley and Owen, 2008). A Nicaragua-based NGO concluded that the biggest challenge in rural logistics is serving the communities located in remote and hard-to-reach areas (Prado et al., 2016). In rural areas in India, the deficiency in infrastructure is the main limitation for the economic growth and productivity of rural populations (Rao and Murthy, 2014). The same holds true for low-income populations in Brazil (Barki and Parente, 2014). Other logistics constraints are related to insufficient capacities of delivery vehicles, delivery time restrictions, e.g. in areas where travelling at night is dangerous or not recommended, and the high cost of reaching distant locations, which could translate to higher cost of logistics services for rural populations (Battini et al., 2014).

It is important to note, furthermore, that LML in rural areas can be made more difficult by the fact that the rural settings can be quite diverse, with different topographies, cultures, service requirements, and purchasing powers. This makes it difficult to recommend a one-size-fits-all solutions for rural areas in general, especially given the differences in logistical facilities, resources, and capacities between the locations.

Less developed economies

One more LML scenario worth discussing is that of less developed economies (LDE). Even in this age of e-commerce and online business transactions, the logistics infrastructure and information technology in these areas are not as well developed as in more advanced settings. In China, while transportation systems, storage facilities, and product distribution channels have been established for leading industries, the logistics infrastructure of the country as a whole was found still to be relatively backward at the time of the study (Lujing, 2011). Access to information technology and their various applications was also limited for logistics enterprises in China. Most companies were not automated and sharing of electronic data to promote efficiency among users was at the primary level, at best (Lujing, 2011). A study on last mile delivery in Cape Town, South Africa, demonstrated bottlenecks in the market. There were no logistics providers serving the needs of local enterprises, and the high cost of outsourcing these services put a strain on the financial viability of local business owners (Coetzer and Pascarel, 2014). Getting actors to serve the logistics needs in less developed areas had been problematic, given the reluctance of many private companies to extend their networks to include low-income communities, who instead opted to serve more profitable urban areas and consumers (Cheng, 2015). In cases when the road network infrastructure suffers damage from continued use, low-income communities may not necessarily have the capacity to have their roads repaired expeditiously, and this hampers the dispatch and delivery of goods to local recipients (Ahmadi et al., 2015).

Future research on urban and rural logistics should look into scenarios for the planning and implementation of appropriate mobility policies within cities while also finding ways to bring much needed basic services to rural and low-income areas of less developed nations.

Consumer demands

The business-to-consumer e-commerce environment is characterised by voluminous, unpredictable, and dynamically changing customer orders. Research on consumer behaviour

has demonstrated vast differences in the customers' willingness to pay for LML across varying age groups (Goethals et al., 2012). Customers of LML have irregular expectations, and understanding how they communicate these expectations is an important part of the logistics process (Ito, 2015). An analysis involving 1,919 customers of an online home delivery grocery business showed that customers choose to use a home delivery service because of the value they place upon the service provided, the quality of the delivered products, and the quality of the online transaction (Boyer and Fröhlich, 2006). Customers who value home delivery are most demanding in terms of the timeliness of the delivery within a specified time slot and the accuracy and completeness of orders received (Lang and Bressolles, 2013).

Indeed, customer satisfaction plays a significant role in LML. As customers have expectations related to the actual product they ordered, equally important are their expectations related to the manner of product delivery (Singh et al., 2016). Particularly, for homogenous and mass-produced products, customers pay the most attention to service quality (Liu et al., 2007). Successful delivery evaluation translates to positive consumer behaviour. Conversely, poor service quality has a negative effect on customer loyalty (Hsu et al., 2010).

The last mile of the logistics process should be handled in a way that guarantees customer satisfaction with both the functional and technical aspects of the product or service. The functional aspects refer to how a customer receives a particular delivery service. The technical aspect refers to what a customer receives as a consequence of the delivery service. The customer's impression of the service received is contingent upon various factors, namely the attitude of the delivery personnel towards the client, the adaptability of the delivery system towards unforeseen circumstances, and accurate tracking and delivery of packages, among others (Ito, 2015). Order accuracy demonstrates the perceived reliability of an online retailer. In cases of inaccurate orders and product returns, customers value a trouble-free system for requesting returns as well as prompt replacement of products ordered (Xing et al., 2010).

Indeed, responding to customer demands is crucial in LML. Customer perception of the speed and timing of delivery (Boyer and Fröhlich, 2006), the premium cost of the delivery service, the safety of their personal information, and assurance of full consumer security throughout the entire logistics process (Chen et al., 2012) all emerge as indicators of excellent service quality as far as consumers are concerned. Customers were found to be most satisfied with providers offering a wide range of delivery options, security of parcels, and limited incidence of losses as well as accurate payment collection and invoicing (Chou and Lu, 2009). Personnel of LML providers should be trained to ensure the security of order information systems at all times and

to present themselves as professionally as possible before customers when performing last mile deliveries (Shao et al., 2012).

Value for money is an intangible indicator demanded by consumers. Sometimes, how a product reaches the customer and for how long the product remains in use say a lot about the value for money offered by a product. The level of customer support and after-sales service provided after the delivery of products is, likewise, a good index of customer satisfaction (Jasial et al., 2016). Customers expect e-retailers to resolve delivery queries via accessible information platforms, including social media or other customer service channels (Bhattacharjya et al., 2016). When large retailers subcontract or outsource last mile deliveries to third-party service providers, they should capitalise on maintaining an efficient and customer-responsive logistics network throughout the entire distribution system. Logistics actors, wherever they are on a product's journey from manufacturing to market, should consider the last mile delivery of goods to customers as a serious activity (Teller et al., 2006).

*Challenges section summary*

The challenges that the providers of the last mile delivery systems encounter are listed below:

- Cost: The increase in the volumes of the orders results in an increase in the delivery costs. The cost drivers include the type of reception, the complexity of delivering systems, size and weight of products, transport requirements, complexity of ordering process, length of delivery time windows, returns and refunds, the handling of shipment, and failed home deliveries.

- Complexity: E-commerce companies usually have complex procurement and inventory management systems. For instance, some products have shorter life cycles and require fast delivery. Other products are consumed in a short period of time, so they have a high demand and necessitate priority delivery. Besides, complexity increases when consolidating different freight types or types from different sources.

    - Urban settings: The LML providers prefer operating in urban areas owing to their population density. However, urban settings lead to a number of challenges, such as car accidents and parking problems, traffic congestion,

uncertainty of travel time, higher energy consumption, pollution, and demand for increased road capacity.

- Rural settings: Rural settings lead to some challenges for LML providers owing to the limited logistics facilities, low-quality logistics services in comparison to the urban logistics operators, and insufficient accessibility because of remote locations.

- Customer demands: E-commerce companies have to deal with a huge, dynamic, unpredictable, and changing number of customer orders. As customer satisfaction plays a crucial role in the sphere of e-commerce, companies have to ensure the functional and technical quality of the proposed products and services.

#### *2.3.4.2 Emerging solutions to issues in LML*

This section discusses literature about the solutions and strategies being employed by both private and public players in the logistics sector to address the challenges in reaching the last mile.

The problems facing LML are immense, and it is imperative to find solutions to resolve the challenges. By identifying potential sources of risk, it is possible to develop contingency plans for untoward service disruptions during last mile distribution (Dettenbach and Ubber, 2015). Programmes such as "Clean Last Mile Transport and Logistics Management for Smart and Efficient Local Governments in Europe" (or C-LIEGE) aim to develop alternative and innovative solutions to address last mile challenges as well as consolidate best practices to ensure energy-efficient and sustainable transport and logistics systems (Cossu, 2016).

Private sector players are leading the way in implementing new systems and innovations in last mile fulfilment. Webvan (US) and Tesco (UK) are notable examples of grocery retailers that were offering last mile deliveries to their clients for products sold online back in 2000 (Tunca and Aboelmaged, 2000). Tech giants Amazon and Google are now experimenting with the use of unmanned autonomous vehicles for aerial logistics (McKinnon, 2016).

Collaboration and sharing platforms

Collaboration and sharing platforms are adapted from the so-called "sharing economy" concept. Transport consolidation, in this regard, can reduce traffic congestion and environmental pollution problems while reducing costs for individual freight carriers (Handoko

et al., 2016). Research studies are looking into not only the economic feasibility of the proposed sharing or collaborative solutions but also their environmental impact (Park et al., 2016).

The results of various research studies continue to emphasise, even quantify, the benefits that could be achieved with the implementation of collaborative logistics solutions. Benefits include reduction in delivery costs, enhancement of the quality of service delivery, optimised use of logistics resources (Muñoz-Villamizar et al., 2015), gaining economies of scale, time savings (Handoko et al., 2014), and positive environmental and social impacts (Clausen et al., 2016).

While synchronising LML with stakeholders' interests is critical, it is inherently challenging to implement (Lindawati et al., 2014). Handoko and Lau (2015) point out that not all orders can be consolidated on a shared platform. Some last mile deliveries will need to be fulfilled individually by private logistics providers, thereby resulting in a certain degree of fragmentation across the LML sector (Handoko and Lau, 2015). In some collaboration initiatives, the participation of players is enforced by policy regulation. Other efforts rely heavily on the willingness of stakeholders to participate. While research on urban logistics stresses the importance of stakeholder participation to ensure success through such as improving the efficiency of last mile delivery in a growing city and developing environmental sustainability, the reasons and motivations of stakeholders for joining logistics collaborations still remain widely unexplored in the literature (Lindawati et al., 2014).

Meanwhile, research focussed on logistics stakeholders is of value as it can help identify the actors and the networks that can aid in the efficient local distribution of goods and services. An example is a study on post-disaster humanitarian logistics in Colombia, where recommendations were developed to achieve synergies among logistics actors and relief networks to optimise the capability of humanitarian response systems (Gil and McNeil, 2015). Similar themes on humanitarian logistics in relief distribution (Das and Hanaoka, 2014) and disaster response planning (Rennemo et al., 2014) were established by the literature reviewed.

Shared collection points and pick-up stations

The fragmentation of last mile deliveries can be addressed using an arrangement such as shared collection and pick-up points. In France, for example, online grocery purchases reach customers through a pick-up station, which could either be a drive-through station attached to the grocery store itself or a solitary pick-up station in a different location (Hübner et al., 2016). The self-pick-up approach is a popular choice for customers who prefer purchasing products online, but find waiting for their deliveries at home inconvenient (Huang et al., 2010). Pick-up

points can be convenience stores or other high-traffic areas where one or more online retailers can deliver a group of orders, instead of bringing the packages to individual homes. When collection and pick-up points are located near residences or in frequented areas such as gas stations or train/bus stations, the customers will need to travel a small distance to collect the goods (Weltevreden, 2008). The shared reception box (SRB) runs on a similar concept. The SRB is an intelligent box installed in communal areas, such as building entrances or lobbies. Goods for delivery are brought by the courier to the SRB, and the customer is alerted via a text message, which also contains a one-time code for opening a particular box where the package is stored. The customer can then retrieve the package delivered at a convenient time using the secure code provided by the courier (Zhang and Lee, 2016). These alternative delivery services using shared collection and pick-up stations benefit logistics operators by lowering operational costs and also help reduce congestion and pollution in urban areas (Morganti et al., 2014). Consolidated deliveries to collection and pick-up points also reduce time constraints for both courier service providers and customers (Zhang and Lee, 2016) and eliminate the risk of failed home deliveries (Weltevreden, 2008).

Technology innovations

Most new entrants to the LML scene are equipped with the latest in technology and use their technical know-how to deliver consistent, efficient, and reliable logistics service. These so-called “pure players” operate entirely on Internet-enabled platforms, as compared to multi-channel retailers, who maintain both online and offline presence in the market (Xing et al., 2010). The e-commerce era zeroes in on providing the utmost convenience and at-your-doorstep kind of service to customers. Logistics functions are vital to any e-commerce enterprise, and this is synonymous with companies having a well-organised distribution system in the digital marketplace (Tunca and Aboelmaged, 2000). Hence, the challenge is to develop highly adaptive, technology-based solutions, which operate in real-time, are open-sourced, comply with legal requirements, and have the ability to integrate into newer and more advanced technologies (Schau et al., 2015).

The landscape of the logistics supply chain is changing. New companies are coming in with new technologies, while traditional companies have started to invest in electronic and Internet-enabled systems. A new logistics infrastructure is where all parties in the supply chain are connected via the Internet in real time (Yrjölä, 2001).

The following section provides examples of logistics solutions employing new technologies to address the last mile problem. It is worth noting that some of these solutions require significant capital investment and have high operating costs, and the level of adoption/acceptance of such technologies will depend largely on consumers' willingness to pay and the value addition gained from their use.

Automated systems

There is no doubt about the practicability of geographic information systems (GIS) in delivery services. Access to mapping databases facilitates decision making for vehicle routing and delivery scheduling systems. The use of GIS improves the efficiency of delivery order systems and results in significant time and cost savings for logistics providers. Vehicle routes, delivery schedules, driver assignments, delivery addresses, estimated arrival times, and order confirmation, are among the various data sets that can be processed using GIS technologies (Yrjölä, 2001). Data visualisation using these systems improves logistics tracking at reduced costs. The frequency and speed of data transmission as well as the quality and quantity of data to be transmitted can be enhanced using new telematics devices, sensors, and navigation systems (Galonske et al., 2016).

Automated systems, such as the Orange County Library System, are streamlining the operation and management of home delivery programmes. Automated systems allow users to manage their accounts online, request or purchase orders using a computer or mobile device, access online databases, and download data or digital products. Such systems are gaining popularity among users owing to their cost-effectiveness and positive environmental impact (Myers, 2009).

Drones and unmanned aerial vehicles

The use of unmanned aerial vehicles such as drones is considered a potential solution for reducing freight traffic congestion in cities. Experimentations in the use of drones are likewise being conducted to aid in the distribution of packages in remote areas that are difficult to access and have poor road infrastructure (McKinnon, 2016). The use of drone technology, however, is governed by strict aviation regulations, suggesting a high level of vulnerability of drone deliveries. Still, the use of drones as a fast and cost-effective logistics solution is under careful deliberation by big players like Amazon and Google and in highly congested areas such as in China (McKinnon, 2016).

3D printing

3D printing, otherwise known as additive manufacturing, is a technology for manufacturing any product using a design software and 3D printer, which applies layer after layer of synthetic material to create the product. 3D print technology is pushing the trend towards customisation and localised production, which is expected to drive down logistics expenses. Large supply chain inventories and distribution points will no longer be needed because the technology allows products to be manufactured on demand on an "as-is, where-is" basis. Products will no longer need to be shipped from other countries or regions because they can be printed on site. The main logistics requirement for 3D printing will be the shipping of 3D print cartridges and equipment.

According to McKinnon (2016), adaption of 3D printing in the consumer market might reduce the need for last mile deliveries of anything other than the filaments, resins, and polymers used in the printing process. While 3D printing is envisioned to reduce urban freight congestion and the related environmental impact of constantly transporting products and raw materials, it is too early to predict how extensively the technology will be accepted. Currently, 3D print technology is far too expensive for the regular consumer to afford. Few attempts have been made to evaluate the impact of 3D printing on logistics operations and global transport volumes (McKinnon, 2016).

Physical Internet logistics

Physical Internet (PI) logistics is a contemporary distribution system that consists of transporting modular containers through specialised transport networks called PI hubs. Modular containers in PI logistics are unique since they can be interlocked or encapsulated within each other, making transport and docking at the PI hubs significantly faster and more efficient. Modular PI containers are designed in such a way as to be easy to handle, store, transport, interlock, load, and unload. The containers are tagged for automated identification and traceability. In short, PI containers demonstrate efficiency in both the physical loading and unloading of shipments as well as the digital tracking and securing of contents. Currently, there is no single global, standardised PI logistics system in place and the interconnectivity of PI systems is still in the development stages. However, PI logistics will need to facilitate

consolidation among players to significantly increase efficiency in the logistics sector (Venkatadri et al., 2016).

*Solution section summary*

- Collaborative and cooperative efforts can help solve the distribution problem by reducing delivery costs, traffic congestion, and impact on the environment. Consolidation can be reached with the help of shared collection points, shared pick-up points, and crowd logistics.
- Drones and other aerial vehicles are novel alternatives to vehicle-based delivery.
- Technology innovations provide solutions to the issues in a constantly changing e-commerce environment. They include usage of automated systems, such as the highly practical geographic information systems and advanced home delivery programmes. Also, 3D printing can be used as a form of additional manufacturing and provide a solution to a number of the delivery issues. Physical Internet logistics is a new distribution system that allows the delivery of the products with the help of specialised transporting modular containers.

## *2.4 Gaps of knowledge in LML:*

*Lack of stakeholder involvement and perspectives:*

As the research focusses on last mile logistics (LML) solutions, this section discusses the gaps in the solution themes only. The literature review has identified several gaps. First, although there have been a number of researches in the field of home delivery that offer solutions to various LML problems, only a few studies have covered LML solutions from the customers' perspective (Myers, 2009, Ghajargar et al., 2016), let alone from the perspectives of different stakeholders (Ghajargar et al., 2016). While academic studies have looked into service quality in logistics management, very few have been concerned with e-commerce logistics (Xu et al., 2013). There is a lack of studies that attempt to gather data from different actors and networks across the supply chain (Khan K et al., 2009).

The need to understand consumer behaviour becomes even more relevant in the light of online services and electronic transactions. In these so-called "e-services", customers now have a role to play in the completion of online transactions. Hence, it becomes paramount to look into this

growing segment of online customers in order to understand their expectations of and experiences with the delivery of e-services (Boyer and Fröhlich, 2006). Punakivi et al. (2001) found that when introducing innovative solutions to last mile problems, one of the biggest hurdles is getting customers to start using the proposed service (Punakivi et al., 2001). Second, missing from the discussion is a detailed assessment of the attractiveness of delivery services with respect to existing logistics infrastructure presently available to consumers (Teller et al., 2006). Most of the studies on the consumers' perspectives in LML failed to look at the factors that influence consumer preferences for LML solutions. There may be other underlying and less salient factors that play a role, such as culture, privacy or risks, which were not accounted for in previous studies.

Future research should likewise explore incentives and motivations of various actors and stakeholders, including supply chain companies, governments, and public institutions (Sodhi and Tang, 2014).

*Lack of deep understanding of the issue:*

Although last mile logistics (LML) and its solutions have received considerable critical attention from researchers, most studies have been carried out in a small number of areas. The literature revealed that there is a need for more studies in this area. This section will depict some of the studies in logistics that touch upon similar areas of this research and will draw their limitations. In relation to logistics delivery generally, personal accounts of freight company managers and drivers on urban deliveries were documented in a New Zealand study. The qualitative study of Hopkins and McCarthy (2016) indicated that there is a changing trend in urban freight deliveries and low-carbon transport transition. They suggested more research in under-researched geographical locations will provide new insights (Hopkins and McCarthy, 2016). Meanwhile, the study by Yu et al. (2016) examined e-commerce logistics companies in North America, Europe, and Asia Pacific to gain lessons and insights that should serve as practical guidance to companies operating in or contemplating on entering the e-commerce logistics sector. They conclude that innovative technology solutions such as big data analytics and cloud computing enhance the e-commerce logistics operation level and decision making level (Yu et al., 2016).

Logistics providers today face tremendous pressure in order to fulfil the needs of last mile customers. Research that provides performance measurement frameworks for stakeholders could help improve the efficiency and profitability of logistics operations. However, there are

currently no standard measures for the performance of home delivery services. Different criteria and indicators could be used to judge whether LML services are offered satisfactorily. Cost efficiency and product quality are common benchmarks for assessing the performance of delivery services (Wheeler, 2001). Regarding overall logistics management, few academic papers have addressed home delivery services in general or service convenience and customer satisfaction in particular (Chen et al., 2011). One such study was undertaken by Domingues et al. (2015), using a set of performance indicators that was developed to assess the quality and efficiency of third-party logistics providers (Domingues et al., 2015). Most of the papers reviewed examined only a single LML strategy or solution. A study on e-commerce logistics in China, for example, focussed only on the delivery of small-sized products, which represents but a fraction of the traditional logistics spectrum (Yang and Yi, 2010). Only a handful of studies sought to compare or investigate a range of LML strategies or solutions which may be applicable to a general location or population. An example is the study by Ghajargar and Zenezini (2016), which provided an exploratory study of not just one, but four innovative delivery solutions: tracking mail and deliveries, delivery to pick-up points, crowd-delivery, and delivery to automated pack station (APS). The authors used a quantitative method (online survey) to determine users' delivery requirements as well as other issues that service users might face. They concluded that crowd source delivery is ranked as the most eco-sustainable and flexible solution, with pick-up points being the simplest form of service (Ghajargar et al., 2016). However, the study did not give sufficient explanation of the topic and comprehensive understanding. Moreover, the study did not give enough consideration to other factors like regulations and social aspects. Furthermore, the study relied only on the quantitative method, it did not take the stakeholders' perspectives into account and it does not fully explain how the innovative solutions were being selected and why. On the other hand, a number of studies qualitatively analysed different LML scenarios. One such study involved a document-based data analysis and semi-structured expert interviews regarding the business models of existing crowd logistics companies. It created a business model concept for the sustainable implementation of crowd logistics services. The study was limited, however, as it was based solely on European companies. In addition, it failed to address different stakeholders' perspectives and other factors that might impact the overall solution (Frehe et al., 2017). Still, a majority of the papers investigating logistics stakeholders or supply chain actors focussed on analysing the decision-making behaviour of supply chain members. A case in point is the study by Li & Ai (2015) that looked into the decision-making process of manufacturers and retailers when choosing distribution platforms for their products. The study helped identifying which

channels are more advantageous given the strict competition and changing circumstances in the supply chain. In competing supply chains, retailers may choose different distribution channels, either a traditional distribution platform or a retailing platform. While extensive and looking at some stakeholders, the study failed to include customers' perspectives (Li and Ai, 2015).

### *2.4.1 Gap in LMD: lack of literature studying LMD solutions*

The systematic review of the literature on LML revealed that there is a limited body of research that considers last mile delivery solutions or takes into account the perspectives of stakeholders. This gap was confirmed again in subsequent literature reviews.

The literature clearly shows that technology development has a direct effect on last mile logistics; meaning that technology can help with some of the challenges mentioned in this section. Furthermore, the development of technology and the growth in e-commerce usage requires more new research to be conducted on these developments, to allow the research to catch up with the industry. In other words, given the fast-moving nature of the subject, research on this topic can quickly become dated, and more researches are always needed. Thus, this research is answering all previous calls from different authors to make a study in the field of last mile delivery solutions, and crowd logistics delivery specifically. One aim of this study is therefore to gain an in-depth understanding of the perspectives of the stakeholders on the existing solutions in LML.

The demand for last-mile delivery will continue to rise in line with the growing trend of adoption of e-commerce and rising consumer demand. CLD has emerged as an advanced and innovative home delivery concept, but successful use of CLD requires understanding the economics, implementation, successful keys, challenges, and technology needed to leverage CLD.

#### *2.4.1.1 Findings and gaps from other LML/D Systematic Literature Reviews:*

Five systematic literature reviews (SLR) have been identified in this study. First, (Oliveira et al., 2017) focussed on sustainability of vehicle-based alternatives for last-mile urban freight distribution. Their findings showed a rise in the implementation of smaller and lighter vehicles for the last mile deliveries in urban areas. They concluded that there is a lack of understanding with respect to the adoption of the emerging innovations in last mile deliveries. In terms of

Crowd Logistics (CL), crowdsourcing was not included in their paper because it is not a vehicle-based solution.

Lim et al. (2018), on the other hand, studied last mile logistics models and identified gaps in the last mile logistics literature on models that they found to be relatively fragmented, thus preventing a comprehensive and holistic understanding of the topic to guide research efforts. Other identified gaps include but are not limited to operational difficulties in performing last-mile operations. In this regard, in order to advance our understanding of the challenges faced by retailers, the topic can benefit from insightful case studies, as well as exploration of the operational processes adopted by retailers to meet these challenges.

The review of the literature by Lim et al. (2018) conceptualises the relationship between a wide range of contingency variables and LML configuration operational characteristics (push-centric, pull-centric, and hybrid system) through a set of structural variables that are captured in the form of a design framework. The authors suggest four potential areas of research that represent the possible evolution of the digital supply chain. In relation to CL, gaps were found in the intersection of last-mile activities and "sharing economy" models, such as crowdsourcing. Also, drones, and 3D printing demand future research. Although collaborative logistics enables assets and capacities to be exchanged in order to increase utilisation and minimise freight, its performance is dependent on the development of a logistics ecosystem for relevant stakeholders (including institutions). Consequently, there are exciting research opportunities to explore new design variables that attract the interests of key stakeholders at different levels (Harrington et al., 2016).

Another SLR, by Ranieri et al. (2018), on last mile logistics innovations, identified five main gaps found in the literature:

a) Innovative vehicles, which are categorised in four types;

b) Studies are required on optimisation of the capacity of proximity stations;

c) Collaborative and cooperative solutions on 1) Urban consolidation centres (UCC) with the use of ICT and 2) sharing resources;

d) Real time data route optimisation;

e) Innovations in public policies.

Regarding CL, there are gaps in collaborative and cooperative sharing of resources, such as vehicles. In general, the authors identified and analysed the latest studies that considerably contributed, with initial proposals, to the decreasing of externalities in urban logistics. In addition, a group of studies dealing with the matter of externality reduction is discussed.

The Melacini et al. (2018) systematic review looked at e-fulfilment and distribution in omni-channel retailing. Similarly, they stated there is a lack of studies on the interaction among different logistics phases and the role in logistics played by retailers in the delivery process. They found only a small number of existing literature reviews that explicitly discuss the problems that e-fulfilment and distribution companies face when selling goods both across the traditional channels and online. Crowd Logistics are not mentioned in their study, as it is not in their scope of work; however, a variety of main topics are still overlooked despite the increasing interest in such as omni channel retailing, including the evolution of retail distribution networks, assortment planning across multiple channels, the logistics role played by stores in the delivery process, and the interplay between various aspects of logistics.
Finally, Olsson et al. (2019) also studied last mile logistics. The authors concluded that despite the increasing number of contributions to last-mile logistics literature, study of the field remains largely incoherent due to the variety of contributory disciplines and perspectives. None of the previous systematic or other literature review articles included a holistic overview of the of the last mile logistics as a study field. The gaps found by Olsson et al (2019) include:

1) Analysing Environmental and Social Sustainability in Last Mile Logistics: economic sustainability most covered, then environmental, and lastly social.

   Previous calls for more studies were not answered sufficiently, as the understanding of environmental and social sustainability in relation to last-mile logistics remains limited.

2) Definition of the scope of Last Mile Logistics
3) Applying theory to the field of LML
4) Limited perspectives on last mile fulfilment
5) Lack of clarity on city logistics in relation to LML

Within the scope of work on last mile logistics, six studies were found that could be categorised as offering business model strategy for last mile logistics. In these studies, the results indicate that the literature covers a variety of aspects and facets that can be grouped into five themes: emerging trends and technologies, operational optimisation, structures of the supply chain, performance measurement, and policy measurement.

*Table 3 Other systematic literature reviews*

| **Systematic literature review authors** | **Focus** | **Gaps identified in last mile logistics or delivery context** | **Gaps identified relevant to crowd logistics** |
|---|---|---|---|
| (Oliveira et al., 2017) | Sustainability of vehicle-based alternatives for last-mile urban freight distribution | Lack of understanding with respect to the adoption of the emerging innovations in last mile deliveries | Crowdsourcing was not included in their paper because it is not a vehicle-based solution. |
| (Lim et al., 2018) | Last mile logistics models | The last mile logistics literature on models remains relatively fragmented, thus preventing a comprehensive and holistic understanding of the topic to guide research efforts.<br><br>Several gaps found including but not limited to operational difficulties in performing last-mile operations. In this | Gap in the intersection of last-mile activities and "sharing economy" models, such as crowdsourcing. Also, drones, 3D printing demand future research.<br><br>Although collaborative logistics enables assets and capacities to be exchanged in order to increase |

| | | | |
|---|---|---|---|
| | | regard, in order to advance our understanding of the challenges faced by retailers, the topic can benefit from insightful case studies, as well as the operational processes adopted by retailers to meet these challenges. | utilisation and minimise freight, its performance is dependent on the development of a logistics ecosystem for relevant stakeholders (including institutions). Consequently, there are research opportunities to explore new design variables that attract the interests of key stakeholders at different levels (Harrington et al., 2016) |
| (Ranieri et al., 2018) | Last mile logistics innovations | Five main gaps found in the literature: a) innovative vehicles, which are categorised in four types; b) studies required on optimisation of the capacity of proximity stations; c) Collaborative and cooperative solutions in 1) UCC with the use of ICT and 2) sharing resources; d) Real time data route optimisation; e) innovations in public policies. | Gaps in collaborative and cooperative sharing of resources such as vehicles. |

| | | | |
|---|---|---|---|
| (Melacini et al., 2018) | e-fulfilment and distribution in omni-channel retailing | Lack of studies in the logistics role played by stores in the delivery process and the interaction between different logistics phases.<br><br>Few literature reviews are yet available that explicitly discuss the problems of e-fulfilment and distribution faced by companies selling goods both online and through traditional channels. | Crowd Logistics not mentioned in their study, as it is not within their scope of work. |
| (Olsson et al., 2019) | Last Mile Logistics | Despite the increasing number of contributions to last-mile logistics literature, the field of last mile logistics is still largely incoherent due to the variety of contributory disciplines and perspectives.<br>None of the previous systematic and other literature review articles include a holistic overview of the last mile logistics as a study field | Within the scope of their work on last mile logistics, six studies were found on crowd logistics and categorised as a business model strategy for last mile logistics. |

| | | | |
|---|---|---|---|
| | | Gaps found in:<br><br>*1)* Analysing Environmental and Social Sustainability in Last Mile Logistics: economic sustainability most covered, then environmental, and lastly social.<br><br>Previous calls for more studies were not answered sufficiently, as the understanding of environmental and social sustainability remains limited in last-mile logistics.<br><br>*2)* Definition of the scope of Last Mile Logistics<br>*3)* Applying theory to the field of LML<br>*4)* Limited perspectives in last mile fulfilment<br>*5)* Lack of clarity on city logistics in relation to LML | |

## *2.5 The concepts of co-creation and crowdsourcing and logistics:*

The final customer is usually considered a passive actor to whom value must be provided across the supply chain (Mentzer et al., 2001, Christopher, 2017). In the service dominant logic in marketing, the customers should be considered as an operant resource instead of operand, that is, as resources on which an operation or act is carried out to create an impact in the service industry (Constantin and Lusch, 1994). Co-creation can be seen from multiple viewpoints. The service dominant logic is based on nine fundamental proposals. The sixth proposition is that *"The customer is always a co-creator of value."* The consumer is often involved in producing value (Vargo and Lusch, 2004, Vargo and Lusch, 2008). Value is defined by what a consumer perceives and determines on the basis of "value in use." "*There is no value until an offering is used—experience and perception are essential to value determination"* (Vargo and Lusch, 2004). Priem (2007) highlighted that the dimension of value creation differentiates between the use value, for which the central objective is to generate benefits from consumption for consumers, and the exchange value, for which the central objective is to generate revenue (Priem, 2007). The supply chain links with this idea through what is called supply chain cooperation. In recent decades, supply chain cooperation, which represents the development of companies working together to gain common advantages (Mentzer et al., 2001), has become a central topic in the supply chain literature (Cao and Zhang, 2012). Hence, the role of consumers has changed to that of co-creators of value. In logistics, engaging an ordinary individual with logistics activities is considered as a valuable and active resource. Crowdsourcing also has its roots in consumer value co-creation (Carbone et al., 2017). The diversity encompassed in the definition of the term crowdsourcing results in the confusing of the bounds of crowdsourcing that can be associated almost with any kind of inter-oriented collaborative engagement, including user innovation, as well as co-creation.

Essentially, crowdsourcing as a concept can be described in varied ways depending on the implementation method of crowdsourcing. Though, it is vital to understand that most if not all of the definitions share a common element of crowdsourcing that entails the utilisation of an undefined crowd. Howe (2008) asserts that crowdsourcing means taking a task that was conventionally done by a selected representative (commonly an employee) and outsourcing it to an anonymous online community (Howe, 2008).

### *2.5.1 Crowd Logistics (CL)*

An emerging business model based on the concept of crowdsourcing is crowd logistics. In crowd logistics, retailers let customers cover the last mile for other shoppers (Hübner et al., 2016). Crowd logistics is defined as the "outsourcing of logistics services to a mass of actors, supported by a technical infrastructure, in order to achieve economic benefits for all stakeholders" (Mehmann et al., 2015, p.123). Technical infrastructure here refers to a communication medium or information technology platform to coordinate the demand and supply for logistics services (Mehmann et al., 2015). The development of the Internet has opened up possibilities for crowd logistics, where every step in the entire value chain can be supported by a virtual network (Mladenow et al., 2015). Digital technologies allow for detailed tracking, alerts, and monitoring of deliveries in real time. Payment processing is likewise handled using a digital platform, e.g. credit cards, wire transfers, and electronic invoices (Punel and Stathopoulos, 2017b). Crowd logistics is a new breed of logistics services, with structural advantages in terms of flexibility, speed, and volume in service delivery (Bubner, 2014). By using millions of citizens as part-time delivery labour in LML, fewer vehicles are needed by logistics service providers, leading to cost-efficiencies for all involved parties (Wang et al., 2016b). As Pfenning (2014) puts it, where users of crowd logistics can obtain flexible and convenient logistic services, service providers benefit financially by offloading costs and responsibilities to the actual users of the logistics service. Frehe et al. (2017) identified three types of crowd logistics services, namely freight transport, personal transport, and purchase-and-delivery. The personal transport service is a type of taxi service, for example, whereas the freight transport service is like a traditional CEP service, including food delivery (Frehe et al., 2017).

*Real world examples:*

Uber is among the most popular and successful examples of crowd logistics. The company acts as a mediator between the crowd, who either demands or provides the logistics service. Uber provides the infrastructure, via a freely downloadable mobile application, through which users can communicate: (1) to request a parcel, food, or transportation service, or (2) to respond to a specific request by another user (Mehmann et al., 2015). Drivers and riders connect over the Uber application and payments are charged once a successful transaction is completed and confirmed using the application.

Checkrobin is another online platform for transport services. The business model promotes "ride-sharing" where cars travelling with unused loading space can offer to deliver private shipments and, in the process, reduce their travel costs. The app also allows senders and drivers to post reviews to ensure service quality. MyWays is another online delivery platform, which works similar to Checkrobin. The main difference is that the packages are delivered to a DHL station or branch, instead of directly to the receiver's address. Crowdsources are thus able to select which parcels they want to collect and deliver using the MyWays platform (Mladenow et al., 2015).

### *2.5.2 Rationale for crowd logistics (CL) research*

This section describes the scarcity of literature on the topic and the motivation to do exploratory research; hence this research will contribute to both the literature and to industry.

Although CL has been widely discussed in the business world, it has not yet been the subject of many academic publications (Carbone et al., 2017). Despite the newness of the topic, CL is a vital area of both high practical and academic interest. Moreover, while a variety of crowd logistics applications can be established using information technology and the exchange of information in practice, the theory behind this trend has received far less attention (Mladenow, 2016). The Rougès and Montreuil (2014) study's main limitation is its data collection process. It used public documents without first-hand information. In the young and rapidly changing crowd logistics industry, journalistic knowledge often lags behind the developments in the industry, and so knowledge about future business models, plans, and visions is rare (Rougès and Montreuil, 2014). Accordingly, crowd logistics research is challenging due to the novelty of the topic, the lack of operational uniformity, and the lack of standardised real-world data distribution structures (Punel and Stathopoulos, 2017b). Given the rapidly growing number of companies providing crowd-sourced services, there is still limited literary coverage of problems associated with these services (Savelsbergh and Van Woensel, 2016a).

Furthermore, Buldeo Rai et al. (2017) carried out a systematic literature review of 42 accessible papers using different terms for crowd logistics, such as crowdshipping, crowdsourced delivery, and crowd logistics. They concluded that although the number of business models and CL initiatives has increased significantly, there is so far limited scientific research on the social, environmental impact, and potential economic sharing process generally and in relation to CL specifically. According to Ermagun and Stathopoulos (2018), CL is a potentially cost

efficient and environmentally friendly system which enables traditional delivery services to be improved or complemented. Moreover, they argue that CL's performance and reliability are linked to the crowd, time flexibility, and the ad hoc courier's willingness to take part in the system.

Other studies covering systematic literature reviews on crowd logistics include those of Mehmann et al. (2015) and Ermagun and Stathopoulos (2018). Both studies concluded, and hence confirm findings from Buldeo et al. (2017), that crowd logistics is still in its infancy and that there is a need for more research (Mehmann et al., 2015, Ermagun and Stathopoulos, 2018, Buldeo Rai et al., 2017). Additionally, Ermagun and Stathopoulos (2018) concluded that to date, work has been based on theoretical or opportunistic data in other fields (Archetti et al., 2016), on conceptual data (Punel et al., 2018), or on the case study (Paloheimo et al., 2016), whereas studies using primary empirical data are few.

Regarding the geographic distribution of CL studies, Buldeo Rai (2017) stated that while the majority of CL studies were focussed in Europe (20), publications focussed on other areas were also found, particularly in Canada (4), Asia (4) and the U.S. (4). Table 4 below shows the main conclusions and gaps deriving from the systematic literature reviews.

*Table 4 Crowd Logistics Literature reviews focus and gaps*

| Crowd Logistics Systematic Literature reviews | |
|---|---|
| **References** | **Conclusions, identified gaps, and future work** |
| (Mehmann et al., 2015) | In total, for the systematic literature review, 15 related papers were listed. The review of the literature sh<br>discuss the subject of optimising algorithms and are technique-oriented. These algorithms were also<br>information and real-time routing.<br><br>In terms of Crowd logistics research, it shows that it is still in its infancy. |
| (Frehe et al., 2017) | Despite numerous ongoing projects, currently there is still a low number of scientific papers published<br>area needs to be developed. Researchers have to be encouraged to perform research on this new subject<br>related studies, on such as crowd logistics initiatives and businesses, than scientific papers.<br><br>One of the most critical components in delivering a crowd logistics service is the crowd itself. There are<br>that are mostly unclear, and the overall impacts on the macro side and political impacts are still unknov<br><br>Three influencing variables frequently mentioned by the experts were trust, publicity and usability. H<br>available as to the specific impact of such influences or the existence of other dominant aspects.<br><br>Currently, crowd logistics has many political constraints. |

| | |
|---|---|
| (Buldeo Rai et al., 2017) | After conducting a systematic literature review and analysing 42 papers, it was concluded that Cl phenomenon. In the area of sustainability, the systematic literature review showed that the implicati parameters.<br><br>The aim of the paper was to indicate if crowd logistics concept can raise urban sustainability, of both fre drawbacks of this research is the lack of stakeholders' involvement such as crowd/drivers themselves a |
| (Ermagun and Stathopoulos, 2018) | (Mehmann et al., 2015) found that crowd logistics research is still in its infancy.<br><br>Identified 133 articles from systematic literature reviews. However, as these were more important to the agreed to concentrate on the papers investigating door-to-door systems. They categorised the 18 retain of their core themes: routing and matching problems and studies that explore the CS operation system u<br><br>Crowd shipping is a potentially cost efficient and eco-friendly system that can increase or comp performance and reliability of CS is tied to the crowd, the time flexibility, and the willingness of ad-hoc crowd is a function of demand, system, and environment characteristics which, despite its importance,<br><br>They build a two-part supply model described by both the likelihood and the bid count of obtaining a b |
| (Le et al., 2019) | They analysed 57 papers including conference proceedings, white papers, and journal papers, book cha *crowd shipping* (as of August 30th, 2018). They found that crowd shipping emerged in 2012 and increa<br><br>More research is necessary. Agreed with (Savelsbergh and Van Woensel, 2016b) that crowd shipping is the participating companies at this time have just a few challenges in terms of government legislation, th implementation. Shows gaps in addressing such as insurance, trust, security, and legal issues. |

The term "Crowd Logistics Delivery" (CLD) will be the focus of this research. This term combines last mile delivery (LMD) and crowd logistics (CL). The term "last mile delivery" is most relevant to the scope of this research. Crowd logistics, on the other hand, involves a different approach and different meanings. Similar to the issue found in the literature of last mile logistics regarding the fragmentation and lack of holistic definition of terms and business models, the crowd logistics literature shares the same ambiguity in terms and business models. Hence, instead of focussing on crowd logistics warehouses or storages, the research will be focussing on the last mile delivery only by the crowd. Figure 8 shows why and how the term is used.

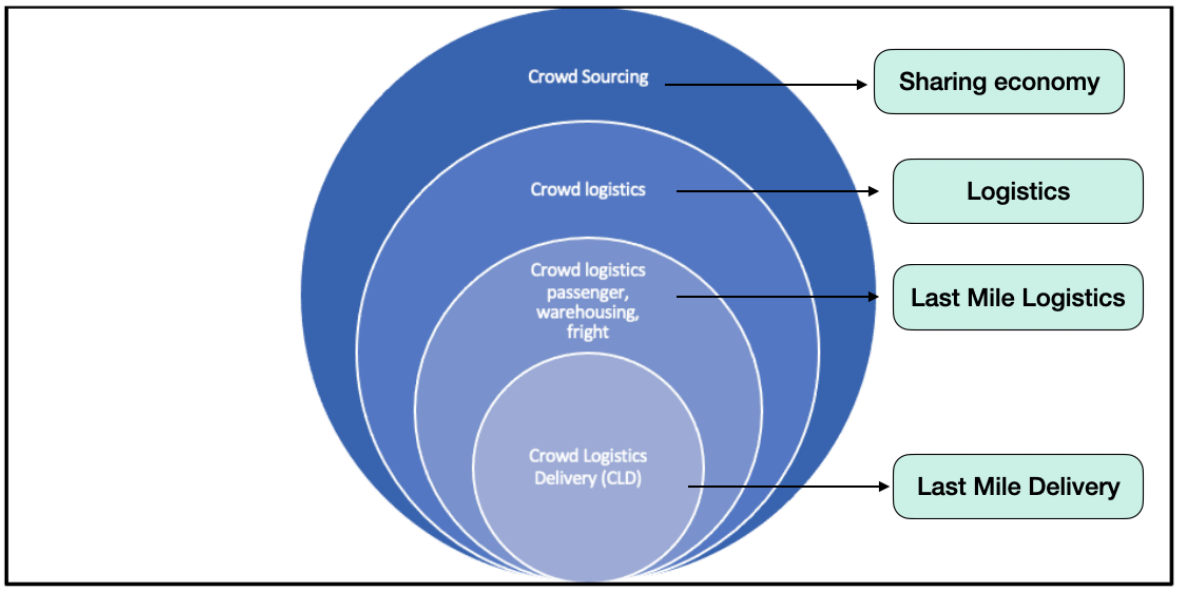


*Figure 8 Terms used in crowd logistics*

To sum up, as crowd logistics (CL) is still in its infancy, there is limited research directed at understanding the stakeholders' perspectives that impact the development of CL. The research has been driven by ambiguities in the literature, in particular the stakeholders' needs in the collaborative consumption concept presented as crowd logistics delivery (CLD) business models. This research discusses the hidden success and failure factors of CLD. Taking the stakeholders perspectives allows the research to reveal unexplored factors and other last mile delivery and crowd logistics delivery issues.

This research is also motivated by the gaps identified in the literature reviews and the growth of such as last mile delivery (LMD) solutions not only in developed economies, but also in developing economies. Developing economies not only have different characteristics and

challenges in relation to last mile delivery, but also different norms and regulations affect CLD. Thus, this exploratory research will enrich the literature by adding and revealing both challenges and opportunities in this emerging phenomenon.

The next section will highlight the relevant characteristics of the context selected for conducting this research.

## *2.6 Overview of last-mile delivery in an emerging context:*

Even though same-day delivery is an option for many people these days, the United Nations predicts that almost 4 billion people are situated in areas without street numbers or names (nation, 2018). For example, some middle-eastern countries do not use post codes. Such drawbacks in logistics lead to delivery problems on a regular basis in regions of the Middle East and North Africa (MENA). A study in UAE claims that as many as 40% of parcels are sent back to the shipper bearing a label that reads "Location of Recipient Not Found," even in urban and affluent areas.

Hence, Crowd Logistics Delivery (CLD) solutions using the consumption collaboration concept for deliveries have started proliferating. Different business models for different deliveries include but are not limited to parcels, food, grocery, cosmetics, and so on. This solution is advantageous for retailers, e-commerce companies, locals, and other stakeholders. As such, an address requirement is unnecessary. These applications of CLD are currently being used in a quartet of nations across the Middle East (namely Bahrain, Egypt, the UAE, and Saudi Arabia). In fact, 30 different Middle-Eastern cities rely on this solution.

Meanwhile, in some countries where several e-commerce service platforms are based, a high percentage of the country's businesses and homes are still unable to have parcels delivered to their front doors.

The study takes place in the context of the Kingdom of Saudi Arabia (KSA) as an emerging economy, where the use of CLD is increasing dramatically as a last mile solution and even replacing some of the logistic service providers (LSPs) within the city. Meanwhile, over 60% of the KSA's population is younger than 25 years, and 92% of the population has smartphones.

Riyadh, the capital city of the KSA, has the highest population, with around 7 million out of the country's total population of 33 million. Khobar is in the eastern province of the country where the major oil and petrochemical companies are located, such as Saudi Aramco (the

largest oil company in the world). Madinah is the second holiest Muslim city in the world after Mecca, and it was the capital of the growing Islamic empire. Although all the stakeholders are from the same country, having interviewees from those different cities allowed the researcher to have different perspectives from different backgrounds, which enriches the study.

The usage of CLD in Saudi Arabia is the highest in the region, and one CLD application has passed 220k orders a day. CLD is growing so rapidly that the number of new users of another application exceeded in the first four months of 2020 that of all users who had registered in the past three years.

According to the United Nations Human Development Index website that measures different life dimensions, such as life expectancy, knowledge and access to education, standard of living and so on, in the KSA, the index ranking has increased dramatically in the last years from 0.698 in 1990 to 0.857 in 2018. The highest figure, of 0.954, was recorded by Norway and the lowest, of 0.377, by Niger (Unitednations, 2018).
According to the World Bank, in 2018, the KSA was in 54$^{th}$ place in the logistics performance indicator list with a value of 3.01, while the highest ranked nation was Germany with a score of 4.20 (WorldBank, 2018)

The Kingdom's 2030 vision of digital transformation, artificial intelligence, and innovations is contributing to an increase in the number of internet users and expansion of the internet speed. According to the Communications and Information Technology Commission (CITC) website 2020 (Citc.gov, 2020), the average speed of internet was 70Mbps and mobile internet speed was 73Mbps. These figures had increased by 10% and 21%, respectively, in the third quarter of 2020. Allocating a budget of around $15 billion for digital infrastructure has made the KSA a leading country in terms of internet speed and the 4$^{th}$ country in the world in expanding the 5g generation. Internet coverage in the KSA is at 99%, which caused the KSA to jump 40 places in the Technology Innovation International Index. In addition, according to the Commission's annual report 2019 (Commission, 2019), the KSA achieved the largest leap in rankings, of 16 places, in the communications and information technology sub-index in the global competitiveness index, to reach a ranking of 36. As a consequence, the accessibility of e-commerce and last mile delivery has increased. According to the statistics publication by Jeddah Chamber in September 2020, which draws on different official sources, such as the Communications and Information Technology Commission and the Saudi Central Bank, e-commerce in the KSA earned almost $5 billion in revenue in 2019. The average use of the internet in 2019 amounted to 96% and there were 25 million users of e-commerce. The number

of e-commerce companies increased by 12.8% which comes down to 29k stores. The annual growth of e-commerce was 60% from 2017 to 2019. Th growth of e-commerce from the 4th quarter of 2019 to first quarter in 2020, adopted from STAT report Jeddah Chamber.

Thus, the tremendous development in the availability of technical infrastructure and accessibility led to a change of consumer behaviour towards e-commerce and other online usage, which increased the pressure on the LMD. The installation of these CLD applications has reached extremely high levels within the last few years.

*During Covid-19:*

There has during the Covid-19 pandemic been more than a 500% growth in the number of CLD drivers and more than 12 million orders a day in the KSA, which represents an increase of 240% in delivered orders. More than 200 cities and towns are now covered by CLD applications, with 32 applications registered officially in the Ministry of Communications and Information Technology website(Citc.gov, 2020) This is considered as a huge number in relation to the population size of 22 million citizens and 10 million non-citizen employees.

*After Covid-19:*

Some e-commerce shopping habits that people have used during Covid-19 will become the norm for a large segment of society, and will make it easier for shoppers to purchase different products without the hassle of going to the malls and searching in stores. Shipping and delivery services and CLD applications therefore will spread widely to fulfil shopping and purchasing demands (Citc.gov, 2020). The study conducted by CITC shows that 69% of shoppers will continue their habit of shopping online after Covid-19. Hence, this research will contribute by presenting empirical evidence of the growing use of CLD and adding to the literature in the last mile delivery context.

# Chapter 3: Theory

## *3.1 Theory Rationale:*

### *3.1.1 Stakeholder Theory:*

In a broad range of fields, including law, health care, public administration, environmental policy, and ethics, the stakeholder perspective has been widely applied (Freeman et al., 2010). The very definition of a stakeholder is any group or individual who can affect or is affected by the achievement of an organisation's purpose (Freeman, 2010). This theory describes and recommends methods through which the management can give due regard to the interests of those groups. In short, it attempts to address the "Principle of Who or What Really Counts". This is unlike the traditional view of a firm whereby the shareholders or the stockholders are owners of the company. The stakeholder theory states that in order for a business to be successful, it must create value for all stakeholders such as customers, employees, suppliers, the community, and financers like banks or shareholders. A manager or entrepreneur cannot look at each one of them individually but needs to make sure their interests as a group go together and must determine how the interests of customers, suppliers, the community, and employees can go in the same direction. The stakeholder theory acknowledges the conflict among stakeholders' interests and the potential of trade-offs. However, stakeholder theory's main aim is to ensure that fulfilling the interests of a stakeholder does not harm the interests of another one (Freeman et al., 2010). Hence, (Freeman et al., 2010, p.1) stated that: *"Stakeholder theory focusses on the jointness of stakeholder interests rather than solely on the trade-offs that sometimes have to be made. It does not deny that such trade-offs are necessary, but suggests that they also represent opportunities to think beyond trade-offs to a question of value creation. Stakeholder theory solves the value creation question by asking how we could redefine, redescribe, or reinterpret stakeholder interests so that we can figure out a way to satisfy both, or to create more value for both."*.

Thus, stakeholder theory is particularly useful for utilising as a lens to understand how synergetic and conflict situations among stakeholders are created and how they affect crowd logistics delivery (CLD) as a last mile delivery (LMD) solution. Furthermore, utilising stakeholder theory may reveal the hidden expectations and needs for stakeholders in the context of LMD using CLD as a solution.

### *3.1.2 Stake and stakeholders:*

The stake can be a concern, issue, or claim that drives the relationship between the stakeholder and an organisation. While there are assumptions that stakeholders have interests in the stake (organisation, products, service, or activity), there might be also interests of the stake in relation to the stakeholders. Thus, a stake can be a tangible or intangible, and a stakeholder is able to take action based on a set of beliefs, values, culture, etc. (Espinosa-Orias and Sharratt, 2006). Stakeholder theory includes other parties, such as government, communities, employees, customers, political groups, and so on. The management of stakeholders relationships impacts on the trajectory of supply chain management (Silvestre, 2015). Stakeholder scholars classified stakeholders into primary and secondary stakeholders based on their saliency to the firm through legitimacy, power, and urgency (Clarkson, 1995, Donaldson and Preston, 1995, Freeman, 2010, Mitchell et al., 1997). For instance, primary stakeholders, such as customers, employees, shareholders government, etc., are salient to the firm, while the secondary stakeholders are those who lack direct legal authority over the firm but can impact on the firm. Similarly, sustainable supply chain management literature (Klassen and Vachon, 2012, Clarkson, 1995, Eesley and Lenox, 2006) identified them as internal and external, where the internal are the primary stakeholders as in the first example, and the external the secondary stakeholders. This study uses classification of stakeholders from (Mitchell et al., 1997). Stakeholders were identified and categorised based on the relationship between stake and stakeholder, their saliency (based on legitimacy, power, and urgency), and the characteristics of the stakeholder in relation to the CLD business model (Mitchell et al., 1997). In other words, the role of stakeholder in a business model as well as its saliency.

However, it is important to note that stakeholder theory does not imply that stakeholders should be treated equally (Phillips et al., 2003); instead, it tries to identify the stakeholders involved in a certain business and find mutual benefits and interests while mitigating the trade-offs (Hörisch et al., 2014).

### *3.1.3 Involving stakeholders in the LMD context:*

Last Mile Delivery (LMD) in urban areas is complicated and there are various stakeholders along the supply chain, all of which have different needs and interests in LMD operations. The engagement of stakeholders is crucial to the development of any framework during the project cycle, which includes definition, project planning and execution, monitoring and evaluation (Graham et al., 2015). A key consideration is therefore to understand the importance of developing and implementing alternative business models and selling a solution across a

network of significant institutional, industrial and individual stakeholders (Harrington and Srai, 2017). Behrends et al. (2008) identified a need for action in urban freight and stressed the importance of an integrated approach involving all actors (Behrends et al., 2008). Based on an assessment of 106 interventions, Quak (2011) concluded that no significant advancement was identified in terms of enhancing city distribution sustainability. First, the right combination of directions for logistics, technology, and policy solutions is missing. Second, not all stakeholders' interests are considered (Quak and Tavasszy, 2011). Different stakeholder groups have different interests; however, even within the same stakeholder group, interests can be heterogeneous (Anand et al., 2012, Macharis and Kin, 2017).

### *3.1.4 Involving stakeholders and their perspectives in the CLD context:*

The relevant stakeholders in crowd logistics, such as receivers, drivers, CLD providers, and decision makers, are vital to the implementation of CLD (Punel and Stathopoulos, 2017b). (Rai et al., 2017) created an adapted stakeholder framework that consisted of recipients receiving goods, commissars sending goods, LSP transportation executed via the traditional method, platform providers, and finally the crowd. In addition, Rai et al. (2017) suggested that future research should investigate for each of the involved stakeholders what kind of crowd logistics model they would support and create a sustainability impact by involving the crowd. However, in this study, direct stakeholders were identified for each business model and divided into three groups: individuals comprising drivers and customers, industrial stakeholders comprising application owners, retailers, and employees, and institutional stakeholders comprising decision makers from different authorities. Additionally, unlike other studies that defined different CLD stakeholders, such as commissioner, LSP, and so on (Mehmann et al., 2015, Frehe et al., 2017, Buldeo Rai et al., 2017, Rześny-Cieplińska and Szmelter-Jarosz, 2019, Le et al., 2019), this study focussed on exploring the saliency of stakeholders to the stake from the stakeholders' perspectives and based on the Mitchell (1997) framework rather than including stakeholders regardless of their saliency. Identifying the stake and stakeholders in each business model allows us to know the salience of the stakeholder to the stake and the attributes. Mitchell et al. (1997) applied the criteria of power, legitimacy, and urgency. In addition, this study used empirical data from ongoing CLD implementations rather than conceptual studies. This enabled the study to gather the perspectives of existing stakeholders. For instance, in this study, the LSP was not found to be a stakeholder in all business models, unlike in other studies (e.g. Frehe et al., 2017b, Buldeo Rai et al., 2017, Rześny-Cieplińska and Szmelter-Jarosz,

2019). Furthermore, prior to this study, the literature on crowd logistics in general has failed to involve stakeholders' perspectives; instead it has focussed primarily on passenger transport (46%), complexity of routing (31%), and data heterogeneity (15%) (Mehmann et al., 2015).

The interviews reveal that the interests and perspectives of stakeholders are in some respects homogeneous and in others not. The CLD stakeholders belonged to one of the three stakeholder groups: institutional, industrial, and individuals. Those groups varied in terms of their saliency in the business models, and so their claims also differed from one to another. Thus, involving the stakeholders is essential in crowd logistics in general and among CLD stakeholders specifically (Rougès and Montreuil, 2014, Punel and Stathopoulos, 2017b, Punel et al., 2019, Le et al., 2019). Knowing stakeholders' perspectives and interests is crucial in order to understand conflicts in the perspectives among the three stakeholder groups. In general, the study shows that CLD as a solution meets some stakeholder claims, especially in the LMD context, and the business models neglect some other claims. As Savage et al. (1991) and Frooman (1999) indicated, stakeholders will act to protect their interests (Savage et al., 1991, Frooman, 1999). Consequently, a CLD business model could succeed if it creates urgency for stakeholders' claims and reduces the threat to the main claims. For instance, the CLD industrial stakeholder will make the claim to increase supply by having more drivers while neglecting the urgency of individuals' claims for a better payment system and compensation. Hence, this study indicates that it is necessary to give equal consideration to all stakeholders' perspectives in order to effectively implement CLD as a successful LMD solution.

### *3.1.5 Value creation and Stakeholders:*

Value creation is the core of the business model idea (Teece, 2010). The main idea of value creation for a stakeholder is stated in various ways, such as value proposition, value object, and stakeholder benefits (Al-Debei and Avison, 2010, Gordijn and Akkermans, 2001, Teece, 2010, Freudenreich et al., 2020, Chesbrough, 2007). Value proposition is defined as satisfying a stakeholder and their needs by creating value. The values defined are based on what the stakeholder perceives as a benefit (Vargo and Lusch, 2004). The concept that is adopted as a lens in this study is exploring the value created within a business model for stakeholders. According to Freeman et al. (2010), businesses should be constructed around certain purposes that form the basis for stakeholders to collaborate and start new relationships with them. Building from stakeholder theory, we can say that since the stakeholder theory has at its core, as previously mentioned, any individual or group that is affected or affects the business, it is

impossible for a business to be successful without having sound relationships with primary and secondary stakeholders (Freeman et al., 2010, Freudenreich et al., 2020). Furthermore, the value should be mutual among stakeholders. If the value is not commonly beneficial for all stakeholders, an organisation will lose its partners, resources, and legitimacy (Freudenreich et al., 2020). As Breuer and Lüdeke- Freund (2017) put it, a joint purpose is needed that results from shared values among stakeholders and the organisation.

However, the CLD literature fails to fully acknowledge the met (mutual) and unmet interests of different stakeholders in order to understand how to orientate the stakeholders towards having a LMD solution. In particular, there is a dearth of understanding of the variety of value creation and exchange that motivates the stakeholders towards CLD and its business models. Furthermore, this study explores the stakeholders' views of the value received and created in the context of CLD. This study's approach comes from the idea that stakeholders' interests shape the success of a solution. Hence, the solution or product that meets the stakeholders' interests by providing the value needed will be a success; unless, however, stakeholders' interests, which are the benefits in the first place, are not in line with sustainability development definitions and dimensions. Meanwhile, in the sharing economy in general, and CL and CLD specifically, there is a lack of a clear understanding of who the value creator and the value receiver are, especially in business models. Hence, this study explores the value creation from a stakeholder theory perspective, which views value creation as collaborative actions and effort among all stakeholders that benefit the business and the stakeholders (Freeman, 2010).

*Stakeholders' interests:*

Previous studies applied the interests of stakeholders by relying on secondary data from other studies. Instead of identifying some stakeholders with such as non-economic interests and others with economic, using pre-existing thinking, (Freeman et al., 2010) propose that future studies should concentrate on addressing a wide range of stakeholders with wider interests. Following their recommendations, and due to the exploratory nature of this study, we do not attempt to conduct this study on any pre-existing theoretical basis that might introduce an unjustified theoretical bias into the study of what constitutes virgin territory. This study will instead look at the stakeholders' interests in CLD that lead to its success as an LMD solution.

*Stakeholders and sustainability:*

Stakeholder theory is one of the main, if not the most frequently used, approaches in sustainability management research (Frynas and Yamahaki, 2016, Montiel and Delgado-

Ceballos, 2014, Hörisch et al., 2014). Sustainability and theory of stakeholders vary in definition but in essence answer the same question of what the company's objective really is (Hörisch et al., 2014). The theory of stakeholders extends the reach of companies to include society and to be interdependent with the social environment. In terms of sustainability, it is defined as "*development that meets the needs of the present without compromising the ability of the future generations to meet their own needs"* (Brundtland et al., 1987, p.15). This falls into what is well known as Triple P and the Three Bottom Lines 3BL of sustainability, i.e. economic growth, social equality, and environmental or people, profit, planet (Soubbotina, 2004, Elkington and Rowlands, 1999, Ashby et al., 2012).

That implies the need for three dimensions of sustainability: the economic, social and environmental. A sustainable business model, therefore, goes beyond delivering economic value to different stakeholders (Bocken et al., 2013). Thus, stakeholder theory and sustainability go further than maximising the values of short-term shareholders. For sustainability, social and environmental ties should be created. The theory of stakeholders aims to establish principles that are not only monetary. Furthermore, sustainability is a multidimensional system that includes all the main stakeholders, as well as society and the world at large (Hörisch et al., 2014), incorporating values that are identified by the relevant stakeholders and which can be economic, social, cultural, or anything else (e.g. just happiness) (Schaltegger et al., 2019). Stakeholder theory literature often cites an instance of interconnected value creation for stakeholders. That is, the creation of value for customers through the production of high-quality goods which customers desire to buy likewise creates value for other stakeholders because it helps the firm in creating jobs, paying taxes to the government, and, clearly, generating profits for financiers. To understand what business model is required to contribute to sustainable development and how this can be done, all stakeholders' perspectives and expectations need to be acknowledged and considered (Hörisch et al., 2014). In return for their contributions, most frameworks do not question what benefits stakeholders get. While they are vital for the implementation and development of successful sustainability solutions, the value of these stakeholders remains unknown (Schaltegger et al., 2019, Freudenreich et al., 2020).

Thus, the sustainability is based on the stakeholder contributions. Prior to that happening, the relationship among them is vital for sustainability and success. For instance, customers buy or use a product, or a service based on the value proposed and received. Knowing whether the value is based on sustainability or not is vital for sustainability. Despite the demand being the

same with stakeholder theory, combination of the three dimensions of practices towards the improvement of sustainability based on stakeholder expatiations and interests is rare in literature within the CL field in general and CLD specifically. Hörisch et al. (2014) highlighted seven similarities and four differences between stakeholder theories and sustainability see Table 5

*Table 5 "Similarities and Dissimilarities Between (Integrative) Stakeholder Theory and Sustainability Management." Adopted-reprinted- from Hörisch et al. (2014, p.332)*

| Similarities | Explanation | Differences | Explanation |
|---|---|---|---|
| Purpose of business | Both concepts extend the view on the purpose of business beyond maximising short-term shareholder value. | Linking social, environmental, and economic aspects. | Sustainability management emphasises the links between societal, ecological and economic goals more explicitly. |
| Separation fallacy | Refusal of the idea that ethical issues can be separated from business. Business and ethics are not perceived as conflicting but as fundamentally interlinked. | Role of nature | Sustainability management highlights that organisations act within ecological systems. |
| Opposition to residual CSR | The ideas of compensating and philanthropy are rejected. Companies are challenged to integrate responsibility into their core business. | Sustainable development | While stakeholder theory is open about the outcome of stakeholder interactions, sustainability management challenges companies to contribute to and shape sustainable development. |
| Profit-making | Profit-making is not regarded as immoral. Creating synergies and mutuality between different interests is one of the core challenges. | Time and durability | Sustainability management addresses questions of durability and keeping (environmental) systems working more explicitly. |
| Ties to strategic management | The short-term view is complemented by a long-term perspective. | | |
| Complexity | Refusal of simplistic, conventional management approaches. Incorporation of further criteria to management challenges. | | |

| | | | |
|---|---|---|---|
| Bridging normative, empirical, and instrumental approaches | Both concepts embody and link descriptive, prescriptive and instrumental elements. | | |

### *3.1.6 Sustainability of CLD*

In terms of sustainability of CLD, two studies (Buldeo Rai et al., 2017, Rześny-Cieplińska and Szmelter-Jarosz, 2019) have assessed the sustainability of CLD. Both relied on the most common definition of sustainable development as "meeting the needs of the present without compromising the ability of future generations to meet their own needs" (Brundtland et al., 1987).

Following the 3BL, *economically*, consumers have access to more variety of goods through CL (Botsman, 2014b), faster delivery (Arslan et al., 2019, Chen et al., 2017a, Botsman, 2014b), and more flexibility (Mckinnon, 2015, Mehmann et al., 2015). Furthermore, the provision becomes more convenient and more affordable (Rougès and Montreuil, 2014, Mladenow et al., 2016), and more personal (Botsman, 2014b, Rougès and Montreuil, 2014). From the *social* perspective, the local user of crowd logistics is known, enabling people to have private interactions with their neighbourhoods and to support communities (McInerney et al., 2013, Carbone et al., 2017). *Environmentally*, by using the current transport flows, crowd logistics raises consolidation and decreases the emissions of traffic, congestion and air pollution (Rougès and Montreuil, 2014, Mckinnon, 2015, Arslan et al., 2019, Chen and Pan, 2016), and contributes to reduction of land use and emission (Mladenow et al., 2016, Paloheimo et al., 2016). Table 6 depicts these benefits. Rześny-Cieplińska and Szmelter-Jarosz (2019) identified 20 criteria for CLD sustainability in relation to stakeholders' needs, comprising six environmental variables, seven social, and seven economic.

### *3.1.7 Summary*

The literature review found that there is a need for more research on LMD solutions. More attention should be paid by both academia and industry to CLD, the usage of which has been booming in the last few years. The author summarised the systematic literature reviews of CLD and identified the gaps. Stakeholder theory will be used as a lens for this research.

The context of this study is the Kingdom of Saudi Arabia that has seen rapid growth in digitalisation and use of internet including e-commerce. Furthermore, the country's different characteristics and norms can contribute to the literature by adding more insights on the topic.

More importantly, the use of CLD before, during, and after Covid-19, shows the significant need for this research.

### *3.2 Summary of the main drivers for CLD:*

Many innovative solutions have been developed to address these problems, such as shared collection and pick-up points, reception boxes, drones, and 3D printing (McKinnon, 2016). Crowd logistics is one of the innovative last mile solutions that is adapting to customer delivery preferences for several advantages. Table 6 tabulates these possible benefits. CLD is a frontier in the logistics systems (Punel and Stathopoulos, 2017a) that have started proliferating. Rześny-Cieplińska and Szmelter-Jarosz identified twenty 3BL criteria for crowd logistics sustainability based on stakeholders' needs. In addition to the advantages listed in Table 6, Table 7 shows the additional factors they identified that are pertinent to LMD.

*Table 6 Summary of the possible advantages from crowd logistics*

| Environmental | Social | Economic |
|---|---|---|
| 1. Reduction in traffic congestion | 4. Private interactions | 6. Greater variety of goods |
| 2. Reduction in traffic emissions | 5. Supporting community | 7. Faster delivery |
| 3. Reduction in $CO_2$ | | 8. More flexibility |
| | | 9. More convenient |
| | | 10. Better priced |
| | | 11. More personal |
| | | 12. Less missed deliveries |

*Table 7 Crowd logistics sustainability for LMD (based on Table 2 of (Rześny-Cieplińska and Szmelter-Jarosz, 2019))*

| Environmental | Social | Economic |
|---|---|---|
| 1. Reduction in $CO_2$ emissions | 7. Connecting individual providers and consumers | 14. Access to adequate IT infrastructure |
| 2. Effective use of loading space | 8. Voluntary character | 15. Free capacity, flexibility, accessibility |
| 3. Developed model of using resources | 9. Tracking transparency | 16. Attractive revenue model |
| 4. Reducing noise | 10. Simplicity and trust | 17. Short time of delivery |
| 5. Less waste | 11. Safety | 18. Strategy of cooperation |
| 6. Less congestion and traffic | 12. Health benefits | 19. Geographical scale |
| | 13. Indicating country specifics and ethics in business model | 20. Insurance |

# Chapter 4: Methodology

## *4.1 Introduction:*

An appropriate research approach is vital when developing and conducting a research project. This chapter presents the research design and methods that will be used in the study. It explores the philosophical assumptions of the research paradigms that strengthen the study. Additionally, the chapter addresses the compatibility of the selected research design with the research objectives, and it also discusses the challenges of using a qualitative method research design in the current study. The remaining parts of the chapter are organised as follows: Section 4.2 presents the research paradigm and section 4.3 discusses the research philosophy. Then the approach used in the study will be discussed in section 4.4, followed by the approach to data collection in section 4.5 and ethics considerations in section 4.6, with section 4.7 presenting the chapter summary. Figure 9 shows methodology overview.

<table>
<tr><th>Ontology</th><th>Epistemology</th><th>Methodology</th><th>Method</th><th>Design</th></tr>
<tr><td rowspan="3">Constructivism</td><td rowspan="3">Interpretivism</td><td rowspan="3">Inductive</td><td>Qualitative empirical assessment. Interpretivist approach</td><td>Case study</td></tr>
<tr><td>Data Collection Method</td><td rowspan="2">Emphasising inductive reasoning</td></tr>
<tr><td>Interview</td></tr>
</table>

*Figure 9 Methodology overview*

## *4.2 Research Paradigms:*

Paradigms can be viewed as worldviews or a set of basic beliefs that deal with first principles (Guba and Lincoln, 1994). Morgan (1979) proposes that paradigms can be used in three different ways: in a philosophical way to reflect basic beliefs about the world, in a social way to provide parameters about how the researcher should conduct his/her endeavours, and in a technical way to identify the techniques and methods that should be adopted when conducting

research. Identifying a research paradigm is important in enabling researchers to develop a framework for their studies. The research paradigm is a driver for how the research should be conducted as well as the behaviour of the researcher (Wahyuni, 2012, Collis and Hussey, 2014). Knowledge does not exist in isolation; the framework should be embedded in research practice to guide the evaluation, assumption, and postulations (Jankowicz, 2005). The most common methods used to investigate research questions are quantitative, qualitative, or mixed methods. They reflect the differences in focus of the various components of the research investigation, assumptions, and the perceptions. The assumptions regarding the process of knowing, in the case of a research paradigm, can be ascribed to the main philosophical assumptions: ontological, epistemological, axiological and methodological (Saunders et al., 2009, Wahyuni, 2012, Collis and Hussey, 2014). Therefore, selecting the appropriate research paradigm is crucial in relation to the selection of research methods. In terms of this study, these components offer fundamental philosophical insights into conceptualisation of the phenomena of interest. The research philosophy drives the study's design strategy and hence the corresponding knowledge contributions. It is essential to have a clear discussion on these philosophical issues to provide an in depth understanding of the knowledge claims of this study.

## *4.3 Research Philosophy:*

The research philosophy explains the essence of developing the ontological, epistemological, and methodological stances that support the research inquiry. The research philosophy mainly relies on the type of research questions to be investigated. Attempting to provide proof is not the only effective way of evaluation, as two main factors in selecting a research philosophy are utility and persuasion in conjunction with suitability (Guba and Lincoln, 1994).

### *4.3.1 Ontology:*

The ontology indicates the researcher's position in understanding the reality, specifically the concept of *what reality is* (Järvensivu and Törnroos, 2010), i.e. the nature and form of reality (Guba and Lincoln, 1994). There are two main approaches of ontology: objectivism and constructionism. Objectivism is an ontological approach that indicates that phenomena confront us as external facts outside our study or effect, and social phenomena and their meanings are independent of social actors (Alan Bryman, 2011). On the other hand, constructivism is a belief that reality is a conceptual form of multiple, intangible mental constructions, socially and experienced based, which thus rely for their form and content on the individual persons or groups that hold those constructions. Constructions are not more or

less “true” in any absolute sense, but simply more or less informed (Guba and Lincoln, 1994). Bryman (2011) defined constructionism as an ontological position where the social phenomena and their meanings are constantly being achieved by social actors (Alan Bryman, 2011). Various authors summarised the constructionism position as retaining the assumption that individuals strive to understand the world they live and work in, through meanings that are varied and multiple (Lincoln and Guba, 2000, Schwandt et al., 2007, Neuman, 2000, Crotty, 1998).

### *4.3.2 Epistemology:*

Epistemology concerns the question of what is or should be viewed as acceptable knowledge in a discipline (Alan Bryman, 2011). Epistemology also can be described as a way of making sense of the world that comprises understanding and knowledge of what that knowledge requires (Crotty, 1998). Epistemology comprises two main approaches: positivism and interpretivism. With positivism the social reality is objective, and there is only one reality and it is external to the researcher, while with interpretivism the social reality is subjective and there are multiple realities and it is socially constructed (Collis and Hussey, 2013). Besides, new forms of paradigms emerged throughout the years. Thus, it is helpful to think of positivism and interpretivism as extremities of a continuous line of paradigms that can exist simultaneously.. As you move along the continuum, the features and assumptions of one paradigm are relaxed or restricted to be replaced by those of the next (Collis and Hussey, 2013).

#### *Positivism:*

Positivism is based on the belief that reality is independent of us and that the aim is to discover theories based on empirical research (observation and experiment). Since it can be scientifically confirmed, knowledge is extracted from 'positive evidence.' In other words, for any rationally justifiable statement, it is possible to provide logical or mathematical evidence (Collis and Hussey, 2013, Walliman, 2011). Furthermore, positivism epistemology holds the position that meaning of realities already exists in objects pending discovery, and they exist apart from any type of people’s consciousness (Crotty, 1998). Since positivists believe that reality is independent of us, they assume that the act of investigating social reality has no influence on that reality (Creswell, 2014). Positivism is usually associated with statistical data and quantitative research data.

Collis and Hussey (2013) summarised the main criticisms of positivism. People cannot be isolated from the social contexts in which they live. Moreover, it is not possible to understand people without questioning the views they have about their own activities. Besides, a highly structured design of research imposes limits on the outcomes and can neglect other important findings. Scientists are not impartial, but part of what they are observing; they add to the study their own goals and beliefs. Finally, it is misleading to capture complex phenomena in one single measure (for example, it is not possible to capture the intellect of an individual by assigning numerical values) (Collis and Hussey, 2013).

*Interpretivism:*

An alternative to positivism is interpretivism, which views reality as shaped based on our perception instead of objective reality. The researcher interacts with the study and what exists in the social world cannot be isolated from what is in the mind of the researcher (Smith, 1983, Creswell, 2014). The act of examining social reality has, therefore, an effect on it. While positivism focusses on the measurement of social phenomena, interpretivism focusses on the exploring of the complexity of social phenomena, with a view to gaining interpretive understanding (Collis and Hussey, 2013). The interpretivism study findings are not derived from statistical data, instead they are derived from qualitative methods of analysis (Corbin and Strauss, 2008, Collis and Hussey, 2013).

In terms of this thesis, the design and analysis rely on contextual data to establish meaning of crowd logistics delivery as a last mile solution; hence, the rejection of 'absolutes' is assumed and plays a key role in the philosophy of this study, with the design and analysis relying on contextual data to establish meaning of crowd logistics delivery as a last mile solution (Näslund, 2002). Interpretivists agree that it is necessary to consider the differences between people as social actors and stress the distinction between conducting research on individuals rather than objects (Saunders et al., 2009). Thus, as this thesis will rely on the thoughts and interests of CLD stakeholders, it follows the interpretivist approach.

## *4.4 Research Approach:*

The two main approaches to conducting research are either a deductive or an inductive approach depending on the relationship between the research and theory (Bryman, 2016). Deductive constitutes the most popular view of the nature of the relationship between theory

and research, where the researcher usually starts with a hypothesis that is deducted from a theory and is then subject to empirical proving (Bell et al., 2018). This results generally in either asserting the theory's accuracy or adjusting it in compliance with the results and repeating the cycle again to validate the new revised theory (Creswell, 2014)

On the other hand, in the inductive approach, theory is the outcome of the research. While the deductive starts with theory, observations, then findings, with induction the process is reversed, since observation is first, then findings lead to the theory (Bryman and Bell, 2011). Thus, the inductive approach pays more attention to humans' understanding and their meanings of their social world. In general, researchers using the inductive approach are more concerned with the context in which a certain phenomenon took place and, as a result, rely on a smaller sample than with a deductive approach (Bryman, 2016). In fact, deductive and inductive logics are mirrors of each other. While inductive research generates and produces new theory from cases and data, deductive research completes the cycle by using the data to test the theory (Eisenhardt and Graebner, 2007). In relation to this thesis, the research used the inductive approach.

### *4.4.1 Research strategy (Method):*

Quantitative research can be defined as a research method that emphasises data collection and analysis quantitatively, which a) includes a deductive approach to the relationship between theory and research, emphasising the testing of theories, b) integrates, in particular, the practices and standards of the natural scientific paradigm and positivism, and c) embodies a social reality viewpoint as an external, objective reality (Bryman and Bell, 2011). (Creswell, 2014, p.4) defined the quantitative method as "*an approach for testing objective theories by examining the relationship among variables. These variables, in turn, can be measured, typically on instruments, so that numbered data can be analysed using statistical procedures*". A quantitative researcher in social science attempts to derive meanings from numerical outputs, using such as survey techniques, experiments and mathematical models (Myers and Avison, 2002).

Qualitative research, on the other hand, can be described as a research method that typically emphasises words rather than quantification in data collection and analysis, which a) uses an inductive approach and focuses on theory generation, b) rejects the practices and norms of positivism in the natural science model, especially in preferring to emphasise the ways people understand, and c) embodies a perception of social reality as a continually shifting emergent

property of the creation of individuals (Bryman and Bell, 2011). Denzin and Lincoln (2005) defined qualitative research as *"a situated activity that locates the observer in the world. It consists of a set of interpretive material practices that make the world visible... Qualitative research involves an interpretive, naturalistic approach to the world. This means that qualitative researchers study things in their natural settings, attempting to make sense of, or to interpret, phenomena in terms of the meaning people bring to them"* (Denzin and Lincoln, 2005, p.3)

When generalisability and statistical representation are not a primary research goal, a qualitative approach may be a better way of understanding the research phenomena in a particular context (Saunders et al., 2009). However, while qualitative studies have been credited as allowing richer knowledge, the contribution of quantitative studies should not be overlooked either in terms of richness (Eisenhardt and Graebner, 2007). Table 8 shows the main differences between quantitative and qualitative research strategies, reprinted from (Bryman and Bell, 2011, p.28).

*Table 8 Fundamental differences between quantitative and qualitative research strategies adapted from Bryman and Bell, 2011, p.28)*

| | **Quantitative** | **Qualitative** |
|---|---|---|
| **Principal Orientation to the role of theory in relation to research** | Deductive; testing of theory | Inductive; generation of theory |
| **Epistemological Orientation** | Natural science model, in particular positivism | Interpretivism |
| **Ontological orientation** | Objectivism | Constructionism |

While most operations management research is quantitative, mainly based on statistical surveys and mathematical modelling (Voss et al., 2002), findings of those studies have to be based on qualitative understanding (Meredith, 1998). Although there is a lack of qualitative studies in the logistics field, a qualitative study is ideal to understand the world around us. A positivist paradigm and quantitative method should therefore not be the automatic method that a logistics researcher should follow. Instead, a logistics researcher should see if complementary research

is needed, such as including qualitative case study approach in the logistics area (Näslund, 2002).

Since there is a lack of published work on CLD, the literature needs to be augmented with knowledge from the field – and in this case, qualitative method seems the most appropriate way to gain this information. Moreover, as this thesis aims to understand an emerging phenomenon and the complicated contextual factors involved, the qualitative method is the most appropriate.

### *4.4.2 Research design:*

A research design relates to the criteria that are used when evaluating business research for generating evidence that is appropriate to a specific set of criteria and to the research question in which the investigator is interested (Bryman and Bell, 2011).

This section will address the following: the empirical work design, describing the design methods and techniques used to access and collect data, and the ethical considerations taken into account before and during the empirical work process.

#### *4.4.2.1 Case study:*

A case study involves conducting an empirical investigation of a contemporary phenomenon using various sources of evidence within its natural context (Yin, 2003). Hancock and Algozzine (2017) summarised characteristics of case studies in three main points. First, while case study analysis often focusses on a group's individual representative (e.g., a female principal), a phenomenon (e.g. a specific event, situation, or activity) is more frequently discussed. Second, the phenomenon being studied should be bounded by space, time, and studied in its natural context. Finally, case study research is highly descriptive, since it is focussed on deep and various data sources. To create mental images that bring to life the complexity of the many variables found in the phenomenon being examined, it uses quotations from key participants, anecdotes, prose composed from interviews, and other literary techniques (Hancock and Algozzine, 2017). A case study researcher can study events (Asmussen and Creswell, 1995), (Benton-Kupper, 1999), situations (e.g. (Hughes, 1998) and (Place and Wood, 1999), programmes (e.g. (D'Emidio-Caston and Brown, 1998), (Howe et al., 2002), or activities (e.g. (Mueller and Fleming, 2001).

By building theory, case study research is an approach that creates theoretical constructs, propositions, and/or empirical evidence (Eisenhardt, 1989). The central concept is to use cases as the basis from which to develop theory in an inductive way. Theory is evolving in a sense

that it is positioned in and developed by distinguishing patterns of relationships among concepts within and through cases and their primary logic arguments (Eisenhardt and Graebner, 2007). According to Collis and Hussey (2013), a case study is a methodology that is used to explore a single phenomenon (the case) in a natural setting using a range of methods to gain in-depth knowledge. The significance of the context is fundamental (Collis and Hussey, 2013). Eisenhardt (1989, p. 534) indicates that the emphasis is on "understanding the dynamics present within a single setting" (Eisenhardt, 1989), whereas Bonoma (1985, p. 204) highlighted that it must be "constructed to be sensitive to the context in which management behaviour takes place" (Bonoma, 1985). Yin (2009) clarifies that case study analysis focusses on answering questions that ask how or why, and where the researcher has little control of current events (Yin, 2009). Yin (2009, p. 18) also described a case study as an empirical investigation that: i) examines a contemporary phenomenon in depth and within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident; ii) addresses the technical distinctive situation in which there will be many more variables of interest than data points; iii) relies on multiple evidence sources, with data requirement; and iv) benefits from the prior development of theoretical propositions to direct data collection and analysis (Yin, 2009).

Case study research can be based on a single case, though there is no clear definition of what a single case or unit of analysis is (Voss et al., 2002). For example, an exploratory case study might be conducted where there are few theories or a deficient body of knowledge (Collis and Hussey, 2013). Another example is an opportunist case study where the opportunity to examine a phenomenon arises because the researcher has access to a particular business, person or other case (Otley and Berry, 1994). Ryan, Scapens and Theobald (2002) defined four types of case study: descriptive, illustrative, experimental, and explanatory case study. With an explanatory case study, the current theory is used to explain and illustrate what is happening (Ryan et al., 2002). Whereas Yin (2003) and Stake (1995) defined different types of case studies including the descriptive and explanatory described by Ryan et al. (2002). Yin (2003) stated that case studies comprise explanatory, exploratory or descriptive types. Yin (2003) also distinguishes between single, holistic case studies and studies with multiple cases, while Stake (1995) defined case studies as collaborative, instrumental, or intrinsic. Table 9 below shows the different examples of these types of case studies (Yin, 2003, Stake, 1995) and is reprinted from "*The Qualitative Report*" (Baxter and Jack, 2008, p. 547-549).

*Table 9 Definitions and Examples of Different Types of Case Studies, adapted from (Yin, 2003, Stake, 1995)*

| **Case Study Type** | ***Definitions*** | **Pu** |
|---|---|---|
| Explanatory | This type of case study would be used if you were seeking to answer a question that sought to explain the presumed causal links in real-life interventions that are too complex for the survey or experimental strategies. In evaluation language, the explanations would link program implementation with programme effects (Yin, 2003). | Joia (2002). A learning comm *Internet Resea* |
| Exploratory | This type of case study is used to explore those situations in which the intervention being evaluated has no clear, single set of outcomes (Yin, 2003). | Lotzkar & Bot study of the de relationship. *C* 294. |
| Descriptive | This type of case study is used to describe an intervention or phenomenon and the real-life context in which it occurred (Yin, 2003). | Tolson, Flemi menstruation: with Parkinso *Nursing, 40*, 5 |

| | | |
|---|---|---|
| Multiple-case studies | A multiple case study enables the researcher to explore differences within and between cases. The goal is to replicate findings across cases. Because comparisons will be drawn, it is imperative that the cases are chosen carefully so that the researcher can predict similar results across cases, or predict contrasting results based on a theory (Yin, 2003). | Campbell & A community se application of *American Jou* 537-571. |
| Intrinsic | Stake (1995) uses the term intrinsic and suggests that researchers who have a genuine interest in the case should use this approach when the intent is to better understand the case. It is not undertaken primarily because the case represents other cases or because it illustrates a particular trait or problem, but because in all its particularity and ordinariness, the case itself is of interest. The purpose is NOT to come to understand some abstract construct or generic phenomenon. The purpose is NOT to build theory (although that is an option; Stake, 1995). | Hellström, No things togethe dementia. *Den* |
| Instrumental | Is used to accomplish something other than understanding a particular situation. It provides insight into an issue or helps to refine a theory. The case is of secondary interest; it plays a supportive role, facilitating our understanding of something else. The case is often looked at in depth, its contexts scrutinised, its ordinary activities detailed, and because it helps the researcher pursue the external interest. The case may or may not be seen as typical of other cases (Stake, 1995). | Luck, Jackson Components o potential for p departments. J 11-19. |

| | | |
|---|---|---|
| Collective | Collective case studies are similar in nature and description to multiple case studies (Yin, 2003) | Scheib (2003) of the school r study. Journal 51,124-136. |

The case study has been one of the most powerful methods in operations management (Voss et al., 2002). The increase of technology and managerial methods creates a need for a field-based research model (Lewis, 1998). Due to strict limits of questionnaires and models, case study leads to new insights and creativity (Voss et al., 2002). To address the research gap, this thesis uses a single case study to explore the usage of Crowd Logistics Delivery (CLD) as a Last Mile Delivery (LMD) solution in the Kingdom of Saudi Arabia. Furthermore, the selection of a single case study was based on the following points identified by Yin (2003):

A) The study answers "how" – how is the CLD implemented? – and "why" – why is CLD used? – questions; (Voss et al., 2002) argue that a case study is not only good at answering how and why questions, but also for developing new theory and ideas that can be used for theory testing and refinement;
B) The behaviour of those involved (stakeholders) in the study cannot be manipulated;
C) Contextual conditions, culture, trust, legislation, etc., will be covered due to the belief that they are related to the phenomenon under study; and
D) The phenomenon of CLD needs to be investigated within its real-life context, especially when the boundaries and context are not clear (Yin, 2003).

In addition, Voss et al. (2002) cite three outstanding strengths of a case study that were also put forward by Bebensat et al. (1987) (cited by (Meredith, 1998) that are relevant to this study:

1- The phenomenon of CLD can be studied in its natural setting, with meaningful and relevant theory generated from the understanding gained through observing actual practice.
2- The case method allows the research questions of why, what and how to be answered, achieving a relatively full understanding of the nature and complexity of the complete phenomenon.
3- The case method lends itself to early, exploratory investigations where the variables are still unknown and the phenomena are not well understood.

In this research, a case study approach was selected, since its information richness permits provision of a deep understanding of an evolving phenomenon in real-world settings and addressing the questions of how and why (Meredith, 1998, Flynn et al., 1990, Yin, 2003). It is claimed that "embracing a field investigation technique such as case studies is bound to make

the individual researcher, and the field in general, richer and better prepared to solve real operation management problems." (McCutcheon and Meredith, 1993).

As mentioned previously, a case study may be exploratory, explanatory or descriptive (Yin, 2003); this thesis is an exploratory research of the CLD solution used as LMD. The aim of the research provides the purposes for why it was conducted. As Collis and Hussey (2013) highlighted, conducting exploratory research is appropriate when there are no or few theories around the problem (Collis and Hussey, 2013). Voss et al. (2002) highlighted that case studies can be used for different purposes, one of these being exploration, which is conducted in the early stages when exploration is needed to develop research ideas and questions to uncover areas for research and theory development. Furthermore, an exploratory case study is useful when there is ambiguity in the meaning of constructs (Mukherjee et al., 2000). As such, this type of case study is particularly suitable for the current research, as CLD is a novel topic, with limited empirical data and theory framework. Thus, the exploratory case study approach will be used to provide a deep understanding about the emerging phenomenon of CLD under study and reveal uncovered issues in this emerging topic.

Although the study is an exploratory single case study approach of CLD that encompasses the issues under study, it includes different business models and as such is more powerful than focussing on only one business model (Yin, 2003). Furthermore, although, this being an interpretivist approach, the author does not attempt to generalise the findings of this study, some of the findings may be similar across different business models, which would allow the study to draw conclusions that could be generalised from one setting to another similar setting (Collis and Hussey, 2013), compared to a study that uses one business model of CLD (Yin, 2003). As (Eisenhardt and Graebner, 2007) asserted, the case study is one of the best (if not the best) means of linking rich qualitative evidence to mainstream deductive research. Moreover, although this study is on a novel topic, the study is guided by stakeholder theory where the actors are selected as groups of individuals, institutional, and industrial to find the mutual and conflict interests among stakeholders *See actors' section for more details about the selection of interviewees selection, and see data collection section for more details about how stakeholder theory formed the data collection.*

*4.4.3 Data collection:*

The data collection process concerns how, where, and when the researcher collects the data (Collis and Hussey, 2013).

*4.4.3.1 Interviews:*

Interviews are a very popular technique of data collection in case study research (Hancock and Algozzine, 2017, Collis and Hussey, 2013). Individual or group interviews help the researcher to obtain rich, personalised information (Mason, 2002), and to know how the participant thinks or feels (Collis and Hussey, 2013). Bryman and Bell (2011) determined that interviews are the primary data collection form used in qualitative research. They also categorised interviews into twelve types including, but not limited to, structured, standardised, semi-structured, unstructured, intensive, and in-depth interviews. They excluded the structured and standardised interviews as they were regarded as connecting better with quantitative research (Bryman and Bell, 2011). In-depth interview is used to refer to unstructured interviews sometimes, but most often it is considered a broad term that comprises both the semi-structured and unstructured interview. Again, as little is known about the topic, the semi-structured in-depth interview was applied in this research. Semi-structured interview refers to "*a context in which the interviewer has a series of questions that are in the general form of an interview schedule but is able to vary the sequence of questions. The questions are somewhat more general in their frame of reference than those typically found in a structured interview schedule. Also, the interviewer usually has some latitude to ask further questions in response to what are seen as significant replies."* (Bryman and Bell, 2011, p.18).

In a semi-structured interview, the interviewer has an interview guide, which is a list of questions on a particular topic (Bryman and Bell, 2011). This is different from the unstructured interview, where none of the questions are prepared ahead of time, but evolve during the interviews (Collis and Hussey, 2013). Although the focus is on how the interviewees understand the issue in both semi-structured and unstructured interviews, there is a flexibility in the interview process (Bryman and Bell, 2011) allowing some room for the interviewer to pursue topics of particular interest (Leidner, 1993). Thus, as the present researcher was starting the investigation with a clear focus, instead of a very broad notion of the research topic, the interview format selected for this study is semi-structured (Bryman and Bell, 2011), using open-ended questions, which will permit exploring and gathering of deeper and broader information (Collis and Hussey, 2013)

The unit of analysis is the phenomenon under study, about which data are collected and analysed, and is attentively related to research questions and the research problem (Collis and Hussey, 2013). The unit of analysis in this study is users of CLD. The semi-structured method allowed the researcher to reveal not only the factors that impact on the development of CLD,

but also how issues related to sensitive topics such as the local culture impact on the context of CLD and the last mile delivery solution.

*4.4.4 Data collection (procedure):*

The researcher conducted face-to-face interviews as an interpretivist approach. This process requires interaction between the researcher and the subject being studied as well as the involvement of subjectivity (Collis and Hussey, 2013).

A) Settings:

Collecting a sample for studying an emerging topic such as CLD is not easy. Some CLD applications are still prototypes, others have failed, and new applications emerge every day. Therefore, I narrowed down the scope of the study to stakeholders in three cities in Saudi Arabia, where many of the CLDs are, and used this as one of the case boundaries. Also, the research is about the last mile delivery and its logistics context. Hence the study did not target or include crowd logistics companies engaged in such as freight crowd logistics, warehousing, or passenger crowd logistics, as their work was outside the scope of the study. The study's focus was on the use of CLD for last mile delivery across multi faced-markets. In other words, different markets and business models that use CLD were considered, including delivery models from e-commerce warehouses to customer, from retailers to customers, and CLD customers to customers. See Figure 10 below.

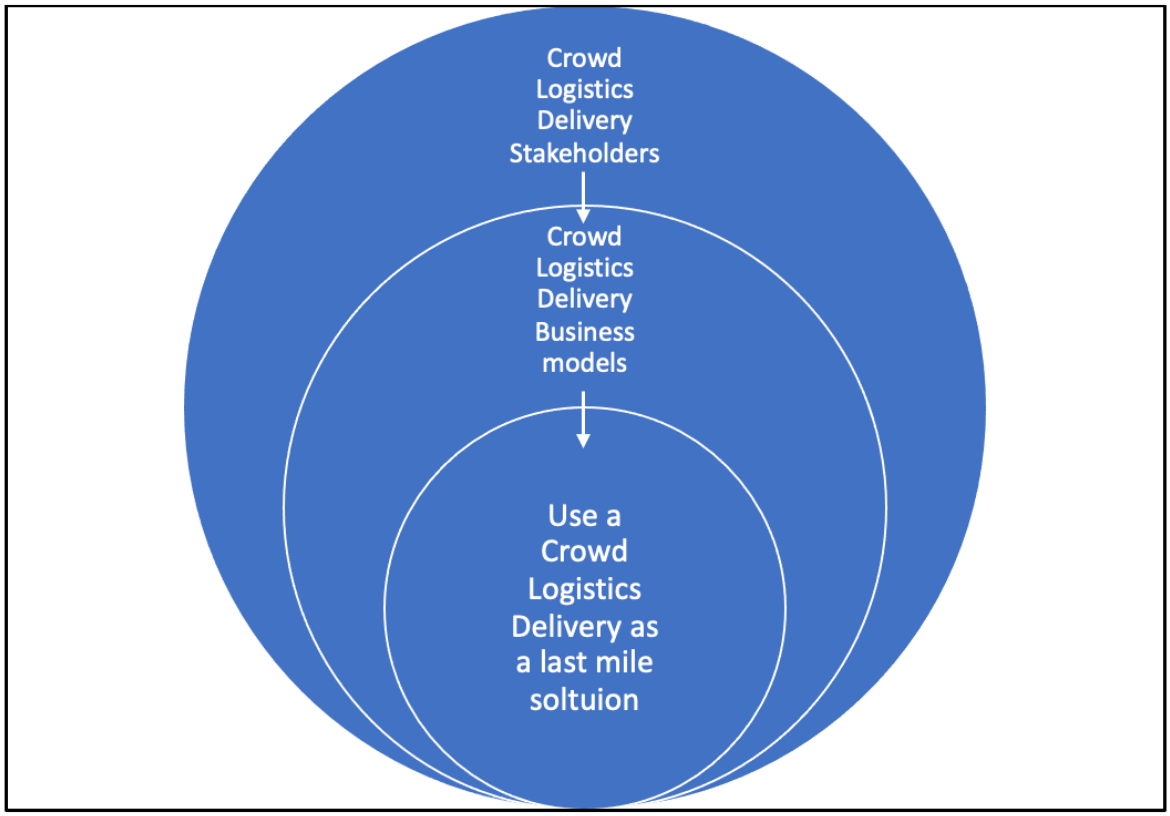


*Figure 10 The foci of the research*

B) Actors:

The data collection method selected was in-depth semi-structured interviews including open-ended questions with different stakeholders. As the stakeholder theory is used in the research, it helped in guiding the data collection. Thus, the stakeholders were divided into three groups: A) Individuals: customers and drivers/crowd, B) Industrial: application owners and employees, retailers' owners and employees, and LSPs employees, and C) Institutional: decision makers in transportation and other authorities. Interviewees were from different business models. However, it is worth mentioning that some customers use more than one business model, so his/her perspectives about both models were included – see the interview table for more details. The initial questions of the interview guide about the implementation, such as the product flow path and other questions determine what type of business models the interviewee uses. It was noted that there is a business model is used more than the rest. Therefore, the researcher attempted to balance the number of interviewees for each business model. The interview list in the appendices show what business model each interviewee uses and explains his/her perspective. All the interviewees are from the same background in terms of knowing the culture, as all are Saudis. However, adherence to culture varied from one city to another. The study focussed on two inclusion criteria for developing codes to create themes, namely density

and intensity within the data. Density refers to the repeated times the concept is mentioned by an interviewee, while the intensity refers to the rigour or unusualness of the idea and experience of an interviewee regardless of the number of times the idea/concept has been mentioned (Asmussen and Creswell, 1995). The interviews took place from August to December 2018.
As the aim was not to generalise, and random sampling was not possible due to the nature of this approach, this research used a snowballing technique to select interviewees, starting from the researcher's and interviewees' contacts who were familiar with the industry. A snowballing technique is used in studies where it is important that the sample participants have had experience of the phenomenon being studied (Collis and Hussey, 2013). Therefore, each interviewee was asked whether they could suggest any other interviewee or knew of anyone else who had been through the same experience. This approach was used by (Pettigrew and McNulty, 1995).

C) Sample selection:

In terms of the sample selection and size in case study research, some readers make the faulty assumption that the cases should be representative of some population, or they ask how theory can generalise if the cases are not representative. The answer simply is that the sampling is not random but appropriate (Eisenhardt and Graebner, 2007). With regard to the sample selection, the researcher relied on the first business model application owner interviewer to identify the business model that exists in the context. That led the researcher to another application owner and a different business model. Furthermore, as previously mentioned, the researcher set the boundaries for the case (Miles and Huberman, 1994), Eisenhardt (1989) and Yin (1994) highlighted that case study researchers frequently build a sample of cases by selecting cases according to different criteria. However, Voss et al. (2002) highlighted that a case should be selected so that it either predicts similar outcomes (literal replication) or creates different outcomes, but for expected reasons (a theoretical replication).

Although the first research question aims to explore and identify the implementation of CLD in relation to all business models in the context, what was vital for selecting any of them was to try to identify distinctive characteristics among them, as suggested by (Miles and Huberman, 1994). They also suggest that they should be relevant to the research question, should be representative of the phenomenon that will be studied, and should be feasible. Thus, three business models were identified, selected, and investigated. As interpretivist studies tends to have a small sample size (Collis and Hussey, 2013), I aimed to find application owners for

different implementations of CLD to have an overall picture of how CLD is implemented in the Kingdom of Saudi Arabia.

D) Process:

The interview questions consist of three main categories that address the research questions and objectives of the study. Specifically, stakeholders were asked to identify the implementation of CLD and its business model along with its sustainability, CLD's value to the stakeholders, and finally stakeholders' challenges regarding CLD development. Initially, the interview questions to identify business models were based on naming, the clients, the value added, and the revenue model adopted from the literature. Magretta (2002) states that a business model should at least address the following questions: Q1. Who is the client? Q2. What is the customer's added value? Q3. How is income generated? Q4. What is the economic logic? (Magretta, 2002). Besides, interviewees were asked about the operational challenges they face in last mile and crowd logistics. The questions were based on some of the last mile solution dimensions from (Harrington et al., 2016) who studied the supply chain literature since 1995, and social, economic, and environmental factors from CLD studies in sustainability (Buldeo Rai et al., 2017, Rześny-Cieplińska and Szmelter-Jarosz, 2019). The research process of collecting background information from the literature is called contextualisation (Collis and Hussey, 2013) and is recommended by (Voss et al., 2002). The interview often starts with broad and open-ended questions, then as the interview progresses the questions become more precise, and the most detailed questions come last (Voss et al., 2002). The interviews were triangulated with informal discussion and these data were used to verify the themes developed from the interviews. For more details see Table 22. The interview guideline sample for some interview questions depends on the stakeholder's position.

The interview questions were designed to answer the broad research questions. They included some of the dimensions from supply chain literature and last mile delivery and crowd logistics, specifically from (Harrington et al., 2016), (Buldeo Rai et al., 2017), and used by (Rześny-Cieplińska and Szmelter-Jarosz, 2019). For instance, relevant dimensions and questions on business models were drawn from the literature, such as how the money is generated, the product flow path, and the customer's role, etc. Then, the questions were piloted with some PhD students and the researcher's supervisors to make sure these semi-structured interview questions covered the overall research questions. *See interview questions in the appendices.* Although the researcher used an interview protocol to avoid biases, he refrained from

suggesting dimensions or there being any right answers. The researcher conducted the interviews using a mixture of English and Arabic language, depending on the respondents' level of English and preferences. In terms of translation, as the data would inevitably be changed in translation, and the cultural differences and linguistics would need to be recolonised while translating (Xian, 2008), the researcher believed that he was in the best position to translate the data, as he knows both the culture and the local language. (Vulliamy et al., 1990) highlighted three factors the researcher should consider in order to enhance the quality of the translated data: the autobiography of the researcher, the knowledge of culture and language, and the fluency of the researcher in writing up language.

Additionally, where necessary, the researcher used follow-up questions to gain a greater clarity and in-depth understanding of the answers, as suggested by (Collis and Hussey, 2013). For instance, such follow-up questions included: *Can you explain that in more detail? Can you give me an example?* The different types of questions used during the interviews included introducing questions, follow-up questions, and direct and indirect question (Bryman and Bell, 2011). The interviews were recorded where permission was given and, in the few cases this was not possible, notes were taken. Interviews were transcribed, verified by the interviewees, and then translated. The interview questions were categorised based on the stakeholder groups.

The author used the thematic analysis method for analysing the data. The six phases of thematic analysis were followed: familiarity with data, initial codes generation, searching for themes, reviewing themes, identifying the theme names, and producing the report (Braun and Clarke, 2006). See Figure 11 Thematic Analysis phases. Adopted from Braun and Clarcke (2006) Thematic analysis was described as the underpinning method for qualitative analysis, and a method to identify, analyse, and report patterns (themes) (Braun and Clarke, 2006), who further argued that thematic analysis should be a method in its own right. It is also identified by (Holloway and Todres, 2003) as one of a few generic skills common through qualitative analysis. In thematic analysis one of the main benefits is its flexibility as a useful research tool that can provide rich and detailed data because of its theoretical freedom (Braun and Clarke, 2006). A theme is captured as something important about the data in terms of the research questions (Braun and Clarke, 2006).

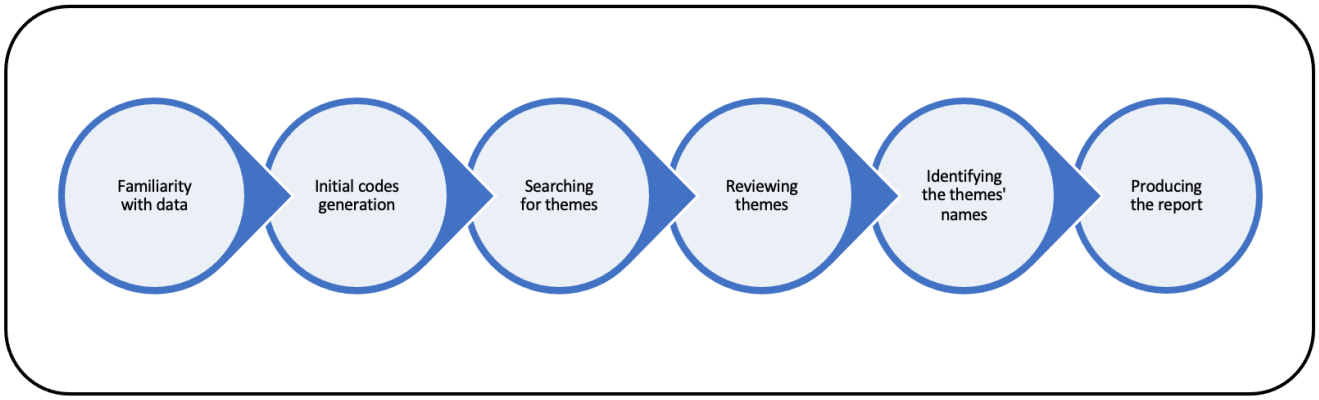


*Figure 11 Thematic Analysis phases. Adopted from Braun and Clarcke (2006)*

E) Challenges:

The biggest challenge was accessibility. I faced accessibility issues with all three types of stakeholders, and particularly with institutional decision makers, industrial application owners, and individual female customers. In relation to institutional stakeholders, the fact that CLD is an emerging topic made it hard to find the right decision makers, though I was able to meet a variety of decision makers. However, some of the issues required different perspectives from another decision maker, again this is due to the novelty of the CLD solution. Furthermore, two of the interviews, specifically with the two high level decision makers, were relatively short. In terms of getting interviews with application owners from industrial stakeholder groups, it took more than two months to obtain the first application owner interview. Not receiving replies to emails, calls not being answered, and the cancelling of interview appointments were the main obstacles that delayed the application owners' interviews. After having the first interview with an application owner, using the snowballing technique, I was able to obtain two interviews with other business models application owners. A similar method was used to find interviewees for the different business models. Some of business models dominate in a city more than the others. Finding female interviewees, on the other hand, was an issue due to the cultural barriers. Efforts to reach females to carry out face-to-face interviews were met with some apprehension. Therefore, most of them asked whether it was OK to do it on the phone. I was only able to conduct three interviews with females. As CLD is still evolving and a number of applications come to life every day, it was very difficult to contact and then meet up with the same customers, drivers, and application owners using the same application and business model. Time was one of the main challenges during the data collection and analysis. Time consumption was also a factor in the translation from Arabic to English after transcribing the

original interview. In addition, sometimes an Arabic phrase may lose its original meaning when translated. Thus, in order to ensure the accuracy of the translation, interviewees were contacted for checking, which further increased the time consumed by the process. Another significant challenge was that the richness of the data made it difficult to focus on certain areas during the data collection and analysis. In other words, the researcher got to the point where everything mattered, all the data and all stakeholders. However, going back to the research questions more often mitigated this issue of overload. Finally, from the interviews, it became clear that interviewees in general were not yet ready to talk about the environmental dimension. The reasons are covered in the analysis and discussion chapters. Figure 12 shows the case boundaries of the topic (CLD).

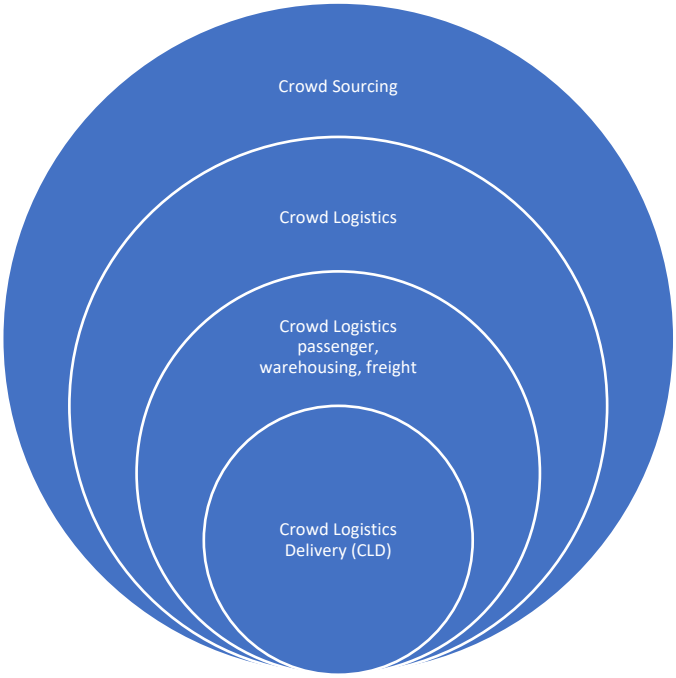


*Figure 12 Case boundaries (topic)*

## *4.5 Reflection on theory*

Stakeholder theory explains and recommends methods through which the management can give due regard to the interests of stakeholders groups. The stakeholder theory used as a lens of the study in variety of ways. First in data collection. The data was collected based on stakeholders' groups: institutional, industrial, and individual. The interviews were based on different perspectives of stakeholders following the stakeholder theory that states that in order

for a business to be successful, it must create value for all stakeholders such as customers, employees, suppliers, the community, and financers like banks or shareholders. Second it was used as lens to analyse the data. The analysis of the data will show where the synergised interests and conflict among stakeholders' groups. This approach was adopted based on stakeholders theory that also stated that the stakeholder theory acknowledges the conflict among stakeholders' interests and the potential of trade-offs. However, stakeholder theory's main aim is to ensure that fulfilling the interests of a stakeholder does not harm the interests of another one. Therefore, the researcher believes that the stakeholders theory is useful to look at more than other theories, such as grounded theory or institutional theory. Thus, this research relies on a stakeholder theory unlike grounded theory approach, which interplay between data collection and analysis to produce theory (Corbin and Strauss, 1990). It also uses different approach than institutional theory that focusses on norms, rules, schemes and other social structures. However, this study focusses on stakeholders' perspectives and attempted to find where synergised and conflicts interests for improvement of the solution.

### *4.6 Data Analysis themes:*

As an important and useful benefit of thematic analysis, the researcher retains flexibility and avoids rigid rules during the analysis. Besides, the researcher's judgment is necessary to determine what constitutes a theme (Braun and Clarke, 2006). Hence, the theme can be identified from a majority of the data provided by interviewees or from a small but important quantity of information related to the research question, as there is no right or wrong way to determine prevalence (Braun and Clarke, 2006). According to Braun and Clarke (2006), a theme should not be measured in a quantified way (unlike content analysis) (Wilkinson, 2000), such as majority of participants or number of participants.

After transcribing and translating the data, the researcher read and repeatedly reread the data to get familiar with it. Transcribing is considered as a way of familiarising the researcher with the data (Riessman, 1993). Then, the researcher starts generating initial codes by having an initial list of ideas. These are also called first cycle codes by (Miles et al., 2020). Thus, the study focusses on two inclusion criteria for developing codes to create themes, namely density and intensity within the data. Density refers to the repeated times the concept is mentioned by an interviewee, while the intensity refers to the rigour or unusualness of the idea and experience of an interviewee regardless of the number of times the idea/concept has been mentioned (Asmussen and Creswell, 1995). Although coding is seen as only technical, preparatory work for higher level thinking about the study among some methodologists, Miles et al. (2020) see it as form of data analysis. The initial cycle of coding within data analysis includes a range of text from one word to a full paragraph. The researcher then conducted a second cycle of coding as suggested by (Miles et al., 2020), whereby the portion coded can be the same unit or longer. Then, the researcher used both manual and software to organise and manage the codes before starting the search for themes (Braun and Clarke, 2006). For this purpose, NVivo and Mindview software were used. See picture in Figure 13. When all the data had been initially coded, researcher started realising themes by looking at how different codes could be combined to create a theme. This is where Mindview as a thematic map and NVivo became even more useful. However, some initial codes were excluded as they did not belong to the combined theme and turned out to be irrelevant to the research scope. Next, the themes were reviewed, and some of the themes became sub-themes and others were merged into one theme, such as tracking and address issues. The tactics used included contrasting and comparing similarities and differences in different business models, as will be shown in the analysis and findings chapter. This is when the fifth step of analysis takes place, naming the themes. Themes are

named based on what the themes are about; the concept is captured, its relation to the research questions, and the reader is provided with clues regarding what the theme is about. For instance, in this study, for the second research question, LMD-related benefits emerged from the detailed analysis of data from different stakeholders of different CLD business models, see Figure 14 and Table 10 for more clarification. Finally, the report is written and the complicated data is presented as a story. Below are examples of the themes extraction process.

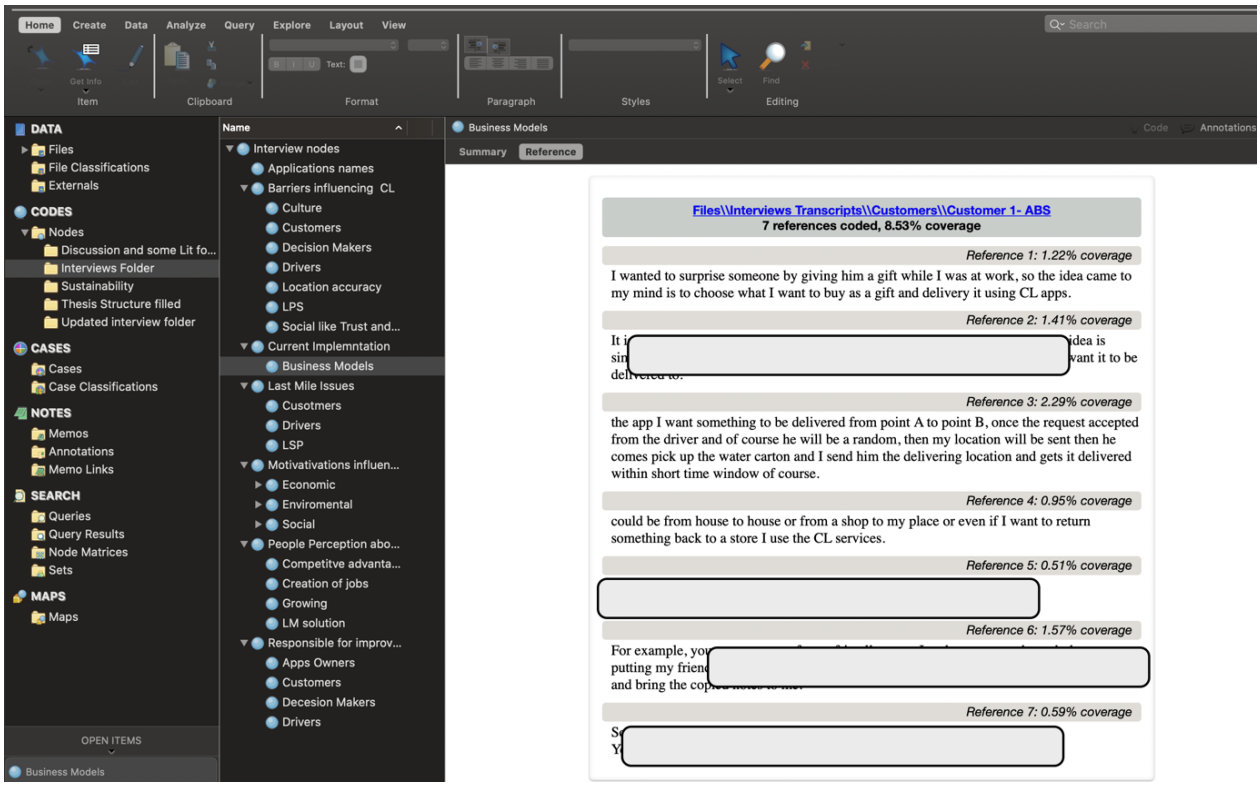


*Figure 13 Nvivo software initial coding from interview transcripts picture*

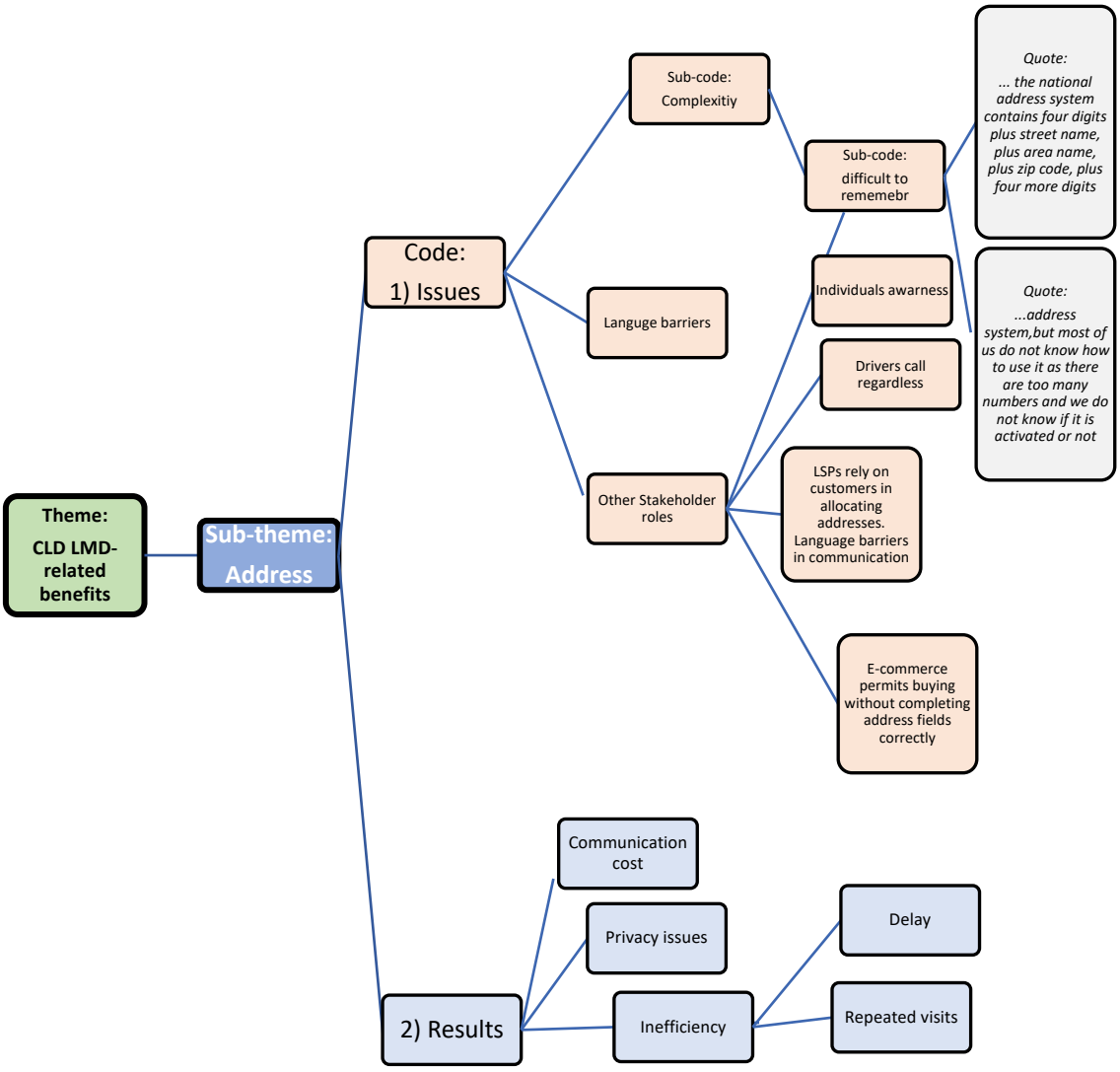


*Figure 14 Quotations theme example*

*Table 10 Themes from internal business model limitations and values sample*

| | Theme: internal business model limitations and values | | |
|---|---|---|---|
| Stakeholders | Codes | Captured/Positive values | Values missed/destroyed/ negative impact experienced by stakeholder |
| Drivers | Registration | Online and quick acceptance B-to-C and C-to-C | Attendance and training (B1) and (B2) |
| Drivers | Orders assigning | Automated (B1), B-to-C, and C-to-C | Self-check (B2) |
| Drivers And customers | Payment model | Distance-based and bidding-based | Fixed price (B2) |
| Drivers | Compensation | B-to-C | No compensation C-to-C |

## *4.7 Ethics:*

The researcher followed the steps required by the University of Sheffield's ethics committee prior to starting data collection. The University of Sheffield protocol requires all researchers that involve human participants or personal data in their research to complete an ethics form and gain approval prior to gathering any data. The researcher received ethical approval after the review and acceptance of the ethics form in the first year of the study, on February 16th, 2018. *See approval letter in the appendices.* An appropriate informed consent form with attached information sheet was designed and emailed in advance to participants where possible; otherwise, the administration was handled in person with the participants prior to proceeding with the interview. No financial payment was provided to participants.

*Safety*:

The industrial interviews took place in the organisations' respective offices under their safety guidelines. Hence, the research minimised the risk of significant physical or psychological harm. Furthermore, all interviews were conducted in normal Saudi business hours (9am- 6pm Sunday to Thursday) and no safety issues arose during the work. No physical involvement in the study was required on the part of participants. Besides, the interview did not involve any cultural challenges and the participants were informed that they were free to leave the interview at any time, without giving any reason, to avoid any potential harm to participants.

*Participants' involvement:*

The participants were emailed or handed a participation information sheet that included the following:

First, a brief description of the study. Then, what would happen during the study. For instance, the participant would not be asked questions regarding his/her personal life. Participants would only be asked questions related to the research topic. Next, the participants were informed about the time commitment. For example, interviews would last around 45-60 minutes each on average, and only one interview per participant would be needed. After that the participants' rights were explained, including the following: "Your participation in this study is completely voluntary, you are free to withdraw from the study at any time, no questions asked, and should you choose to withdraw from the study, your data will not be used in any way."

Next the benefits and risks of the study were explained. If any of the questions asked during the interview caused distress or made the participants feel uncomfortable, the participant was encouraged to ask the interviewer to move on to the next topic. Finally, the participants were assured of the confidentiality and anonymity of their information and inputs. The audio recordings and any notes made by the researcher during the interview would be kept strictly confidential. The interviews would not be heard by anyone other than the researcher and would not be used for any other purpose other than for academic research. At the end of the interview, the researcher provided the participants with his supervisors' email addresses in case they had any questions or concerns. Then, the participants signed a consent sheet to participate in the study.

*Security of the data:*

The collected, recorded, and stored data is controlled by the University of Sheffield. The data will not have any personal characterisation. The transcripts are stored on a personal laptop,

external encrypted folder on USB, and cloud system. In the case of submission for publication, all data will be anonymised as explicitly stated to interested participants. Notes were typed up according to agreed formats and standards. All data are for analysis purposes only. No individual-level data or privacy issues will be considered. All data, folders and accounts will be secured by username and password and these will change every two months. Data will be strictly available for the researcher and supervisory team only. Participants were informed that their responses and information will be kept strictly confidential and anonymous. The participants' institutions will not be identified or identifiable. All data will only be used in the PhD research (PhD Thesis), and potentially for publication in a journal, as stated in the participation information sheet.

## *4.8 Summary*

An exploratory empirical study was chosen for this research as it aims to establish initial evidence on the essence of CLD implementations and its role as a last mile delivery solution. This approach of exploration and analysis is suitable for an emerging field where the context of the research is unfamiliar and novel. Having selected an interpretivist approach that contends that people cannot be isolated from the social contexts in which they live, the researcher conducted a qualitative study that would allow exploration of this new topic and provide more flexibility to understand the impact of social, contextual, and silent factors, such as culture, based on participants' understanding. Hence, this approach would take account of important individual insights. Furthermore, this research followed the inductive approach as it is more concerned with the context in which the phenomenon of interest occurs. From this viewpoint, the qualitative approach would also provide valuable insights into experiences in the particular research context.

One of the researcher's motivations for selecting a qualitative research methodology was that most operations management research is quantitative. Across all the studies of the last mile logistics (LML) topic, according to (Olsson et al., 2019), only three papers (Morganti and Browne, 2018, Frehe et al., 2017, Hübner et al., 2016) have conducted interviews as a methodology in their research. The findings of quantitative researches should be based on qualitative exploration. Thus, this research attempts to apply a qualitative approach to contribute understanding and knowledge of this emerging topic on which other quantitative studies can rely. As suggested previously, logistics researchers should investigate whether

complementary research is needed, such as including a qualitative case study approach in the logistics area, instead of automatically applying a positivist paradigm and quantitative method.

The exploratory case study approach was chosen to answer questions that ask how or why. It can provide information richness and a deep understanding of an evolving phenomenon in real-world settings where there are no or few theories to explain the problem.

Interview questions were generated from the nature of the research questions and the previous literature in both the last mile delivery and the crowd logistics context. Mindview and Nvivo software were used to organise transcripts, codes, and themes. A thematic analysis approach was used for data analysis.

# Chapter 5: Data Analysis and Findings

## *5.1 Introduction:*

This chapter details the answers to the three main research questions. Each section addresses a research question and its objectives. Then, it will present how interview responses were fitted into codes and themes and then linked to the relevant literature.

### *5.1.1 RQ1 recall:*

*RQ1) How is crowd logistics delivery (CLD) implemented in the context of Saudi Arabia?*

RO1: To identify the CLD business models and their characteristics

RO2: To identify the stakeholders engaged in different business models

RO3: To explore the limitations of the CLD business models from the perspectives of different stakeholders

RO4: To explore how CLD business models create value for their drivers, thereby making them attractive for use as an LMD solution

### *5.1.2 Interview questions recall and explanation:*

RQ1) *How is crowd logistics delivery (CLD) implemented in the context of Saudi Arabia?*
Initially, the interview questions to identify business models were based on naming, the clients, the value added, and the revenue model adopted from the literature. However, during the first few interviews, some questions evolved to correspond with the interviewees' responses, regarding such as registrations and assigning drivers. One of the advantages of the semi-structured interviews and the qualitative approach in general is that it gives the researcher the flexibility to respond to the interviewees' answers in order to gain greater understanding.

In terms of defining stakeholders for RO2, the main stakeholders during the implementation will be defined based on three stakeholder attributes: power, legitimacy, and urgency (PLU) of the stakeholder to the business model introduced by (Mitchell et al., 1997). The main reasons to identify the stakeholders are to understand the implementation from their perspectives, their interests and claims, how salient the stakeholder is to a business model, and how important their claims are to the application owner and hence to the business model. Then, the success factors within the implementation of business models from both application owner of a business model and the crowd (the drivers) perspectives will be discussed. The drivers are the

lifeblood of CLD and the main stakeholder that is most salient to the stake. Knowing what attracts the drivers to use a CLD business model contributes to the business model's success, thus CLD's success. Although previous studies mentioned the motivation of the crowd to participate in CLD (Lindawati et al., 2014, Punel et al., 2019, Punel and Stathopoulos, 2017b), the motivations for participating in one business model rather than another are still unknown. The related factors are based on the values of a business model and on met and unmet interests that stakeholders identified and perceived as benefits (Vargo and Lusch, 2008, Bocken et al., 2015, Schaltegger et al., 2019). Knowing these factors will allow the industry to develop improved business models. Furthermore, they will reveal the crowd interests of the main stakeholder, and this stakeholder's relationships with industrial stakeholders. Finally, the sustainability limitation will be identified based on the implementation of a business model against crowd logistics sustainability frameworks (Buldeo Rai et al., 2017, Rześny-Cieplińska and Szmelter-Jarosz, 2019), and the stakeholder perspectives based on their answers towards sustainability questions. The industrial and institutional stakeholders were the main targeted groups for sustainability questions.

## *5.2 How is CLD implemented in the Kingdom of Saudi Arabia:*

The models can be differentiated by the stakeholder who organizes the last mile delivery. *Table 11* defines these types.

*Table 11 Business models categorised by "Who organises the Last Mile Delivery"*

| | **B2B-Contract** | **B-to-C** | **C-to-C** |
|---|---|---|---|
| Stakeholder who organizes the LMD: | E-commerce company contracts with CLD provider to organize LMD tasks. | App organizes the LMD for the customer by automatically selecting the drivers based on location | The customer organizes the LMD through the app by selecting the suitable driver for the LMD task |

This section covers research objectives 1 and 2. It depicts the different crowd logistics delivery business models and the relevance of the stakeholders to the different business models based on their saliency and relevance. Figure 15 shows the section overview.

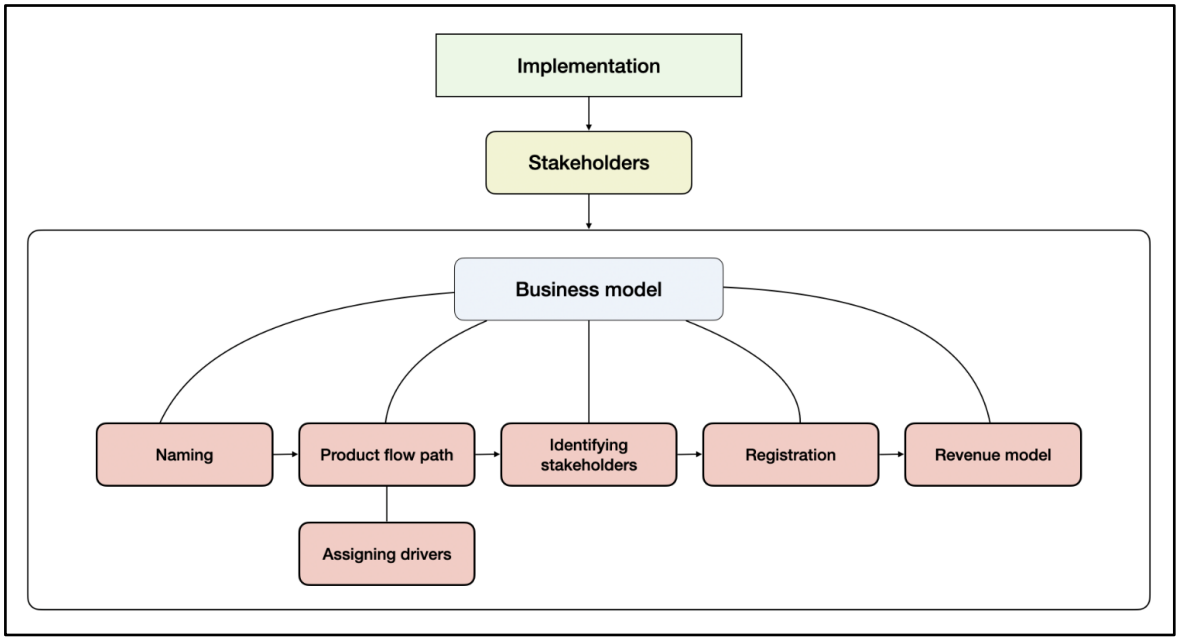


*Figure 15 Section overview*

### *5.2.1 Business-to-Business-Contract (B-to-B-Contract):*

#### *5.2.1.1 Naming:*

The naming of all business models emerged from the application owner definitions based on certain factors, such as the product flow path of the business model. 2, (B1) and (B2). It is important to note that, as mentioned in the challenges section in the methodology chapter during data collection, in (B2) only the perspectives of the drivers were included, as the application owner for (B2) could not be reached due to the accessibility limitation.

*Application Owner perspective:*

The first Crowd Logistics Delivery (CLD) application is B-to-B. The idea of this business model is based on a contract between an e-commerce or Logistics Service Provider (LSP) company and the CLD provider, where the application provides a channel for drivers to sign up and provide a service. The driver picks up a package from the e-commerce/LSP's warehouse that has a contract with the application. The driver will have the customer's information and

delivers it to the customer. See Figure 16. The owner of the B-to-B-Contract model application defined model as follows:

> *"We are Business to Business. Meaning, we get paid by the business (e-commerce/LSPs). That brings me sales, not customers, and we, as a business, receive the payment, so the payer is a Business and the receiver is a Business. We do not get money from customers but from e-commerce or LSPs. While the other business models are B to C or C to C."* HD Application Owner

The application owner differentiated this business model from others based on contract-based, payment flow, and the interaction of stakeholders in his definition of the B-to-B business model, as well as the products flow path. Therefore, the researcher named this model as B-to-B-Contract to differentiate this model from the traditionally known B-to-B model.

#### *5.2.1.2 Products flow path*

The idea is to have the 'crowd' collect the items from warehouses and implement the last mile phase by delivering them to the end customers. In other words, the e-commerce/LSP company does the whole of the supply chain work starting from the first mile but leaves the last mile for the CLD. The crowd then will work as drivers for this CLD provider and select the items assigned by CLD providers to each driver. Therefore, the CLD application in this model receives items from e-commerce/LSPs and assigns them to the current drivers who have signed up to the application. Hence, the CLD provider acts as a mediator or facilitator between the e-commerce/LSP company and the crowd. The facilitator is responsible for the coordination, so it provides an application and supports this application with an IT team. The IT team are specialists that are able to support functions such as track and trace, call, and pay. Therefore, the drivers sign up and get paid from the application and deliver the packages that come from e-commerce sales. HD, an application owner, explained this process:

> *"We sign contracts with e-commerce companies. They give us the packages, and we (our drivers) deliver them the same day. The e-commerce company gives us the customers' information."* HD Application Owner

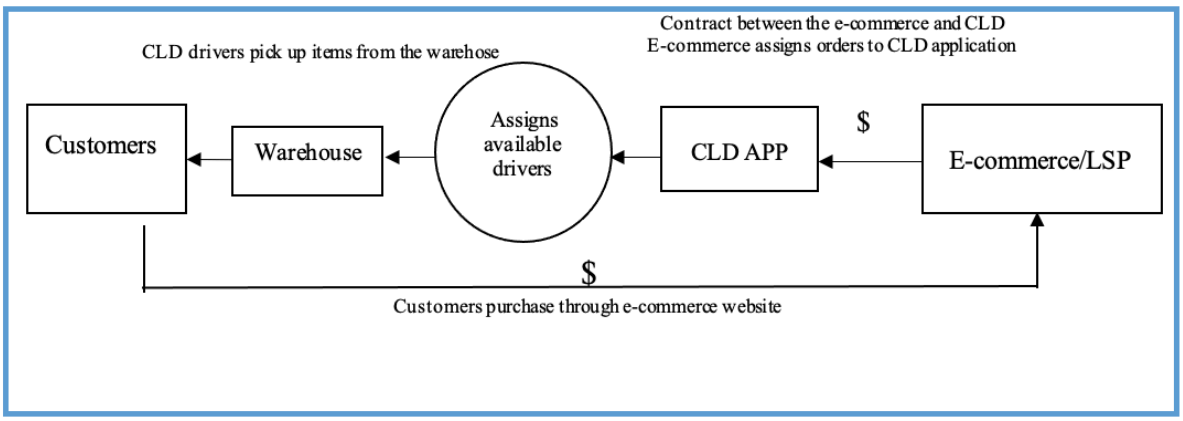


*Figure 16 B-to-B-Contract Product Path A*

*5.2.1.3 Assigning drivers for delivery:*

The ways of assigning the packages to the drivers for delivery can vary from one application to another. Drivers in both B-to-B applications, i.e. (B1) and (B2), are assigned the items based on the availability of the drivers once the items are received by the CLD provider from the e-commerce/LSP company. The drivers will be provided with the location of the warehouse. However, the way of assigning the orders is different.

*Assigning items for drivers (automated vs unautomated):*

A key difference highlighted between (B1) and (B2) is the technology used in assigning the drivers. This shows that the (B2) does not use any type of notifications for orders which might not add the same value that (B1) added to their drivers. There is also a higher chance of error and this can add to costs and poor levels of customer satisfaction as, unlike (B1), it is not automated. Another difference is the procedure of signing out the items. In (B2), the driver scans the barcode of the items under his name so the application employees know who picks up what. While in (B1), the driver is automatically assigned by the application packages.

In (B1), the CLD provider's team assigns the amount and type of items to drivers using a technological process. In (B2), however, the drivers pick up the items from the warehouse based on their preferences, which only involves drivers scanning the items on their way out of the warehouse. An application owner described the usage of technology:

> *"In our model, we are Uberizing the courier, receiving the items from e-commerce or LSPs and assigning them to available drivers from the crowd."* HD Application Owner

*Drivers' role:*

In (B1), the model employed ICT to assign orders to the available drivers. However, in (B2), the drivers who have signed up personally go to the warehouse whenever they want to deliver, with little interaction with technological platforms. As MHS, (B2) driver, explained:

> *"I do not receive a notification from the application about the available items to deliver. However, I go to the warehouse whenever I feel like I want to deliver and I pick up the items I want. Then, I scan the items' barcodes."* MHS Driver

Another (B2) driver explained:

> *"I pick up the items I want to deliver from the warehouse and scan their barcodes on my way out."* YSA Driver

*Customers' role:*

Customers do not deal with the CLD providers if there is an issue with their delivery; instead, they contact the e-commerce company directly. On the other hand, the customers interact with the drivers during the delivery.

However, the drivers will contact the customers when more information is needed, which occurs almost every time in both (B1) and (B2). Therefore, the customers' role is not just receiving packages from the driver, they are also involved in location clarification *(this problem will be discussed further in the address issue section 5.4.4.1).*

#### *5.2.1.4 Identifying the direct B-to-B-Contract stakeholders:*

The direct stakeholders that the B-to-B-Contract business model deals with are based on the three stakeholders' attributes: power, legitimacy, and urgency (PLU) and their saliency to the business model. These attributes were introduced previously in the PLU framework presented in Table 12. The key definitive stakeholders in B-to-B-Contract model are the-commerce companies, Logistics Service Providers (LSPs), and drivers. While Table 12 shows how stakeholders were analysed using the saliency model and including definitive, dominant, and discretionary stakeholders.

The definitive stakeholders are those who have the ability to influence the application model whether in affecting or producing behaviour, legitimacy of having a stake/claim on the firm

and the actions of the entity are appropriate within the socially constructed system, and the stake is critical to the stakeholder and it is time sensitive. Thus, drivers, third-parties (e.g., LSPs/e-commerce company) are definitive stakeholders to the B-to-B-Contract model, while customers are latent as they are legitimate in having a desirable social good, but the B-to-B-Contract model can choose to ignore them. See Table 12. While traditionally stakeholders have a stake in the organisation, the organisation, like any stakeholder, sometimes has a stake in the stakeholder. In this case, the B-to-B-Contract model has a stake in the drivers and the third party. However, the application owner himself is a stakeholder to CLD. Therefore, the application owner is a definitive stakeholder to CLD, where CLD is the stake and the application owner is the stakeholder. In this sense, CLD as a last mile solution has a stake in the lens of the B-to-B-Contract model, and the definitive stakeholders are application owners, drivers, and authorities.

*Table 12 B-to-B-Contract Stakeholders relevance*

| | Relevant Stakeholders to the stake B-to-B-Contract model - explanation | | | |
|---|---|---|---|---|
| **Stakeholder** | **P** | **L** | **U** | **Type of** |
| **Drivers** | √<br>Able to influence the B-to-B-Contract model by their action (e.g. participation, or behaviour) | √<br>The driver's stake is aligning with his norms and beliefs. So, drivers have a legal and moral right to expect the application to satisfy their interests. | √<br>Drivers' claim is time sensitive and drivers' relationship is critical to the B-to-B-Contract model | Definitiv |
| **Third-party (LSPs/e-commerce companies)** | √<br>Able to influence the B-to-B-Contract model (e.g. contracts and volume) | √<br>Have the legal right to claim and expect satisfaction | √<br>Their relationship is critical and time-sensitive to the B-to-B-Contract model. | Definitiv |

| | | | | |
|---|---|---|---|---|
| **Authorities (decision makers)** | √<br>Able to influence the B-to-B-Contract model decision and conditions | √<br>They have the legal right to be heard | -<br>It is not time sensitive unless their claims become urgent. The relationship is not critical to the B-to-B-Contract model | Dominat |
| **Customer (individual)** | -<br>Customers do not have the ability to influence the B-to-B-Contract model as they do not deal with the organisation | √<br>Customers have the moral right to claim, social- and norms- related | -<br>Their claim is not time sensitive and B-to-B-Contract model can choose to ignore | Discretio |

*5.2.1.5 Registration*

The driver's registration requirements differ from one application to another. Although the drivers' registration is done online through the B-to-B-Contract applications, the B-to-B-Contract model requires drivers to attend before being able to work. As previously stated, the steps and conditions vary from one application to another. In the B-to-B-Contract model, both (B1) and (B2) require drivers to register in person after signing up on the application. In other models of the CLD, drivers can sign up through the application/platform without attending physically to register or to provide paper documentation, as we can see in *the next sections*. However, some applications are more creative than other applications in solving some of the issues that CLD face, such as quality. In addition, each application has its way of recruiting drivers.

Although the customer is classified as of low salience to B-to-B-Contract business models, B-to-B-Contract business models apply post-registration requirements for drivers to ensure the quality of the delivery service not only for customer satisfaction but also for quality and safety, which may impact the CLD provider and other stakeholders as well. These post-requirements for drivers are vital in terms of overcoming challenges as will be discussed later in the challenges sections. The two B-to-B-Contract model applications, (B1) and (B2), both have post-registration requirements, but they are different. On one hand, (B1) requires the drivers to attend two hours of training before they are able to work. The training programme includes, but is not limited to, safety, quality, and customer services. On the other hand, (B2) requires drivers only to come and provide a signature after reading the conditions and rules. However, a post-registration process is important from the industrial perspective. The post-registration process influences the quality and brand damage issues. Thus, the (B1) application took an extra step to overcome some of the issues that face CLD, regarding such as quality and brand image, to add value for the individual stakeholders and the community in general, both of which help in service sustainability. As HD, application owner, stated:

> *"Any driver we have attends a 2 hours training programme. After that, he will be a pilot (a driver) with highly focussed orders. This driver will be on the phone with one of our employees to make sure everything is going well. Things like receiving the orders, not making the same mistakes, and the way he handles the product. Then we give him a booklet that has everything he needs. Then, we give him a probation period. In this period, we take*

*feedback, and if we get a lot of negative feedback about the driver, we retrain him."* HD Application owner

It is important that the application owners monitor these details in order to be successful. Here the training added value for the drivers by improving their skills, which also added value for e-commerce companies and LSPs. As we will see in the other models, drivers can damage the brand name through the way they interact with customers and the delivery quality, which is a barrier for LSPs. In (B2) application, however, there is no training programme for drivers and no tracking of the drivers' quality of delivery. In this application, drivers need only to come in person to sign paperwork that includes, but is not limited to, issues such as damage, loss, and other responsibilities. As YSA, driver of the B-to-B-Contract model, explained:

*"At the beginning, I had to sign some papers to confirm that cases of theft or loss are my responsibility. When I want to work, I go directly to the warehouse, I pick the package I want, and I scan the barcode so they know I took this specific package. All packages have the customer's address, phone number, and alternative contact number."* YSA Driver

Hence, a training programme is not required in every B-to-B-Contract application. However, it helps in improving the drivers' skills and the service quality. Moreover, the training programme for the drivers allows the application owners to hear from the drivers about any issues or inquiries, which greatly helps in the development of the overall application over time.

In addition to the training programme that (B1) application developed, the application took an additional step to recruit more drivers by accepting older cars. As HD explained:

*"It was difficult to persuade people to sign up with us as drivers. Therefore, we checked … and … (name of CLD competitors and passenger types) the earliest year of car they accepted was 2012, and we changed it to 2010. Drivers started signing up with us. It is all about talking to your drivers."* HD Application owner

*Drivers' role in registrations:*

Drivers, on the other hand, go through the registration process and are held personally responsible for damage or thefts, as YSA mentioned. The driver has the full responsibility in case anything happens to the items. HD, the owner of (B1) application, highlighted:

> *"In our model, we pay the e-commerce companies or LSPs for any damage that happens to the items, then we will investigate the driver*." HD Application Owner

In this matter, however, the HD application owner has a different method to ensure that the driver takes on some responsibilities, such as applying rules with regard to deposits. HD took also a further step to provide trustworthy service and ensure that nothing is lost or stolen (*Trust will be discussed in RQ3).* HD explained:

> *"One of the challenges in CLD is trust, how I can give the driver a package that is worth 2500 SR, and he might take it and I never see him again. So, we came up with the solution, the driver pays in advance as a deposit and we give him packages worth the deposit he paid."* HD Application Owner

Therefore, we can see the differences in the applications in terms of registering the drivers, the types of conditions, and the quality level. Some applications make an extra effort and invest more to make sure the *trust* and brand name are at a high level. As we can see in the conflict and impact on its success in later section, this factor may increase the trust between the application owners and the drivers.

However, (B2) application has an agreement and contract with the drivers covering issues that might happen during the delivery. The driver signs a contract that contains a condition that the driver must pay up to 100,000 SR in case the package is not delivered or is lost or damaged. YSA Driver says:

> *"I signed an agreement before I started working, one of the conditions is that I might pay up to 100,000 SR in case of any missing, stolen, or damaged items"* YSA Driver

*5.2.1.6 <u>What is the revenue model for Application Owners and payment model for drivers?</u>*

This type of model relies on e-commerce/LSP customers for revenue generation. Meaning, if there are no contracts with e-commerce companies, the application is not feasible.

*Application Owner:*

The application owner gets paid by an e-commerce company based on the contract that indicates the number of items assigned and delivered, then the drivers get paid by the application owner. The application receives a small percentage of each delivery and gives the

rest to the drivers. Therefore, the applications in this model depend heavily on high transactions to be profitable. The application owner, HD, explained:

> *"My profits depend on high transactions. If my monthly expenses are 250,000 SR a month, I need 200 thousand deliveries at least to cover my expenses."* HD Application Owner.

*5.2.1.7 B-to-B-Contract Summary and lessons learned:*

The section has shown how the B-to-B-Contract model works by explaining the naming, product flow path, identifying the stakeholders, and registration and revenue and payment model. The model was defined as business to business (B-to-B-Contract) that is based on a contract between e-commerce/LSPs and the CLD application.

The B-to-B-Contract CLD application business model deals with e-commerce companies/LSPs, rather than customers (individuals). While in the other B-to-C and C-to-C models, as it will be shown in *the next sections, 5.3.2 and 5.3.3*, the customers use the CLD application to make orders. In other words, the customers make orders through the CLD application instead of e-commerce/LSPs.

Therefore, the B-to-B-Contract model deals with e-commerce/LSPs, as a sales provider and contractor, and arranges for the drivers to deliver to e-commerce/LSP customers. Hence, the B-to-B-Contract model relies on existing customers provided by e-commerce.

Two applications of B-to-B-Contract models were included in the interview process, (B1) and (B2). Although both are based on the same model and their stakeholders are similar, their ways of assigning their drivers and the payment models are different. See Table 13 and Figure 17.

*Table 13 B-to-B-Contract Implementation findings summary*

| **Theme: B-to-B-Contract Model** | Two B-to-B-Contract providers (applications) | |
|---|---|---|
| Focus and codes | (B1) | (B2) |
| *Naming* | Same naming based on:<br>• Contract-based with e-commerce's/LSPs companies<br>• Stakeholders' interactions and product flow path | Same naming based on:<br>• Contract-based with e-commerce's/LSPs companies<br>• Stakeholders' interactions and product flow path |
| *Products flow path* | From warehouses to the end consumers | From warehouses to the end consumers |
| *Assigning drivers* | Based on driver's availability<br>Notification given | Based on driver's availability<br>***No*** notification |
| *Assigning items for drivers* | Automated assigning | Drivers' preferences, scan items on way out |
| *Customers' role* | Contact e-commerce/LSP company if issues arise | Contact e-commerce/LSPs company if issues arise |
| *Direct and definitive stakeholders to CLD* | Application owners, E-commerce companies, LSPs companies, and Drivers | Application owners, E-commerce companies, LSPs companies, and Drivers |
| *Registration* | Physically come and attend 2 hr training session | Physically come and sign. No training required. |
| | 2500 SR deposit | No deposit required, but agree to pay up to 100,000 SR in cases of non-delivery, damage or loss |
| | Older car models allowed | Not mentioned |

| | | |
|---|---|---|
| *Revenue Model: Application owners* | Percentage of number of items assigned from e-commerce/LSPs<br>- High transaction level needed | Percentage of number of items assigned from e-commerce/LSPs<br>- High transaction level needed |
| *Payment method for drivers* | Distance-based | Fixed-Price |

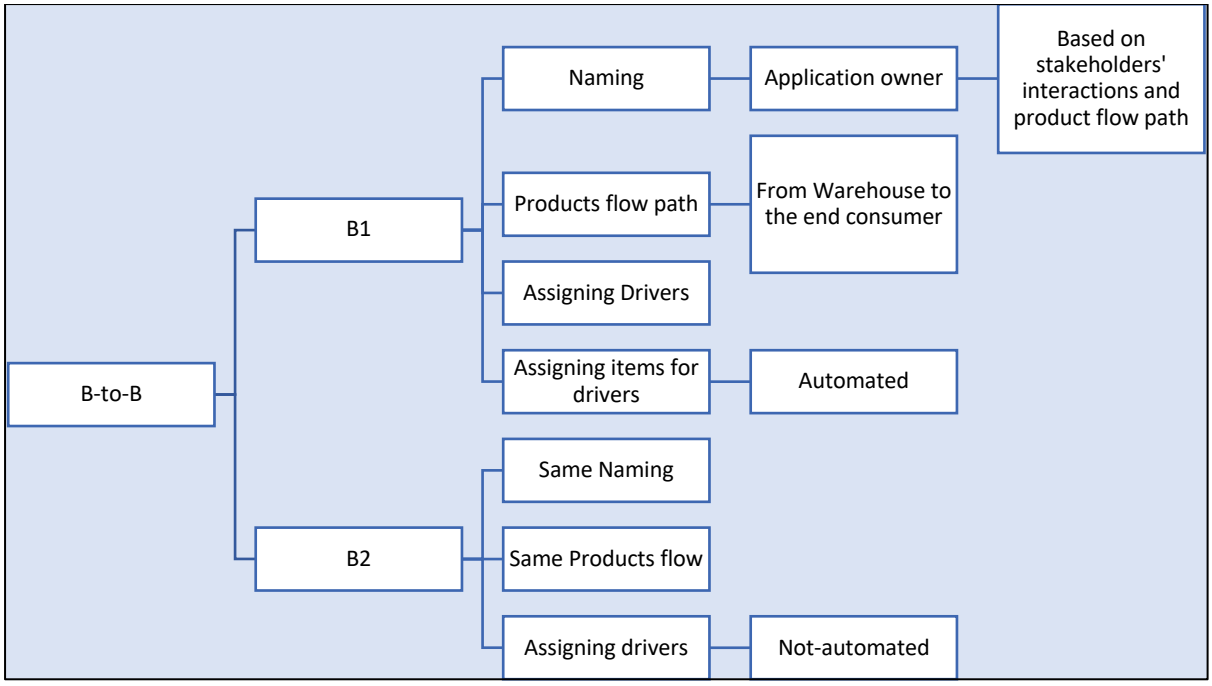


*Figure 17 B-to-B-Contract structure*

*5.2.2 Business-to-Customer (B-to-C)*

*5.2.2.1 Naming:*

The basis is business-to-customers (B to C) where the customers are the individuals who make the order through the application (business). However, retailers (restaurants included) are also customers for this type of application business model, as the application makes money from the restaurants' commissions. BS identified the business model:

> *"We are a mediator between restaurants and customers. Business to Customer type of business. We have contracts with restaurants that we see as our partners, and based on their sales we take commission"* BS Application Owner

The retailers in this case (B-to-C) are restaurants, but it might be applied to other types of retailers in different contexts. Hence, this same business model might be applicable to different types of retailers.

*5.2.2.2 Products flow path:*

This type of CLD business model relies on contracts with retailers (in this case restaurants) that the retailers must meet certain standards. While B-to-B-Contract relies exclusively on a contract with e-commerce companies/LSPs and drivers, the B-to-C model deals with both ends, the individual stakeholders on one end, who are the customers and drivers, and the retailers on

the other end. In other words, the customers use the application to make orders for deliveries, and drivers use the application to get orders and receive payment. While retailers use the application as a channel to make sales by marketing their products on the application. Unlike the B-to-B-Contract model which only deals with e-commerce companies/LSPs, under the B-to-C model, drivers sign up and obtain orders and payment from individual stakeholders, customers, through the application.

*5.2.2.3 Assigning drivers for delivery:*

The application owner of the B-to-C business model explained that the underlying process of assigning drivers to specific deliveries uses an algorithm. The algorithm matches the customer's order with the nearest available driver (location-based), and the order page on the phone shows the distance between the restaurant (pick-up point) and the customer's place (drop-off point). Therefore, it is a *location-based* use of ICT. See Figure 18.

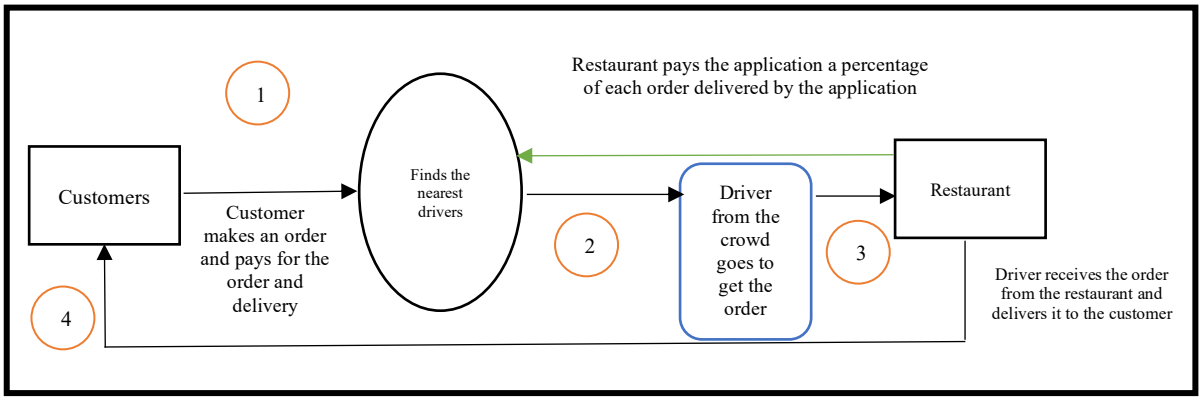


*Figure 18 B-to-C Model Product Flow Path*

*Restaurants' role:*

The retailers sign a contract with the B-to-C application owner. Next, a device will be installed in store for receiving orders that come from customers through the B-to-C application. Then, the retailer prepares the items ordered for the B-to-C driver to collect and deliver. YL restaurant owner described the process:

> *"We request the service online on the CLD provider website, then it takes about two weeks to install the device in the restaurant and to start receiving orders from customers"* YL Restaurant Owner

The restaurant has the option to accept or reject the order; however, based on a contract, the number of rejections should not exceed the number agreed on between the restaurant and the application. After acceptance of an order by a restaurant, the order will be received by one of the drivers for delivery. That was explained also by YL.

*Drivers' role:*

Drivers receive orders based on their location when the orders have been made by customers. The algorithm will assign the nearest available drivers for the order. Among all the available drivers, the first driver to accept the delivery task gets the job. Then, the location will be given in the application map to navigate the driver to collect the order from the retailer and deliver it to the end customer's location.

*Customers' role:*

Customers place an order through the B-to-C application. After the order is made, the customer provides his/her location using the map embedded in the application.

*5.2.2.4 Identifying the direct B-to-C stakeholders:*

The B-to-C business models deal with restaurant owners, drivers, and customers. The CLD application generates the task and manages the last mile delivery by using the crowd as drivers. See Figure 19.

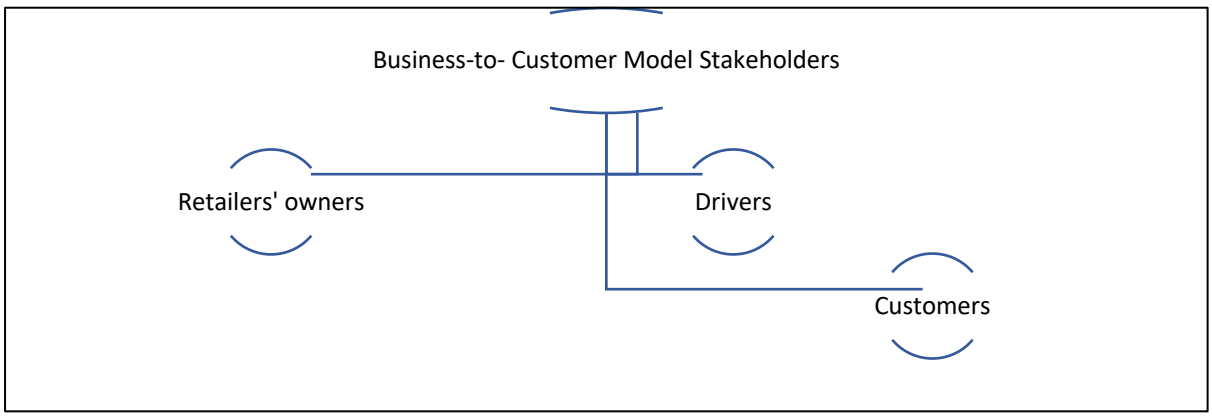


*Figure 19 B-to-C direct stakeholders*

*Table 14 Relevant Stakeholders to the stake B-to-C model*

| | Relevant Stakeholders to the stake in B-to-C model, explanation | | | |
|---|---|---|---|---|
| **Stakeholder** | **Power** | **Legitimacy** | **Urgency** | **Type of st** |
| **Drivers** | √<br>Able to influence the B-to-C model by his action (e.g., participation, or behaviour) | √<br>The B-to-C driver's stake is aligned with his norms and beliefs. So, drivers have a legal and moral right to expect the application to satisfy their interests. | √<br>B-to-C deals with urgent individuals claims, which are time sensitive, and drivers' relationships are critical to the B-to-B-Contract model. | Definitive |
| **Retailers** | √<br>Able to influence the B-to-C model (e.g. contracts and volume) | √<br>Have the legal right to claim and expect satisfaction | √<br>Urgent retailers' claims affect the relationship with B-to-C CLD provider and this is critical and time-sensitive to the B-to-B-Contract model. | Definitive |

| | | | | |
|---|---|---|---|---|
| **Customer (individual)** | √<br>Customers have the ability to influence the B-to-C model as they deal with the provider directly | √<br>Customers have the legal and moral right to claim, social- and norms-related | √<br>Their claims are time sensitive and B-to-C model cannot choose to ignore them | Definitive |
| **Authorities (decision makers)** | √<br>Able to influence the B-to-B-Contract model decision and conditions | √<br>They have the legal right to be heard | -<br>Their claims are not time sensitive unless they become urgent. The relationship is not critical to the B-to-B-Contract model | Dominate |

Table 14 shows the relevant stakeholders to B-to-C and highlights the differences in saliency between the B-to-B-Contract and B-to-C stakeholders based on the products flow path and application owner's point of view within a business model. The different stakeholders are the individuals: customers and retailers. Customers in B-to-C have the power to influence the CLD providers through their claims and participation, whereas with B-to-B-Contract the customers are direct stakeholders for e-commerce companies or LSPs, and B-to-B-Contract deals with drivers and e-commerce or LSPs rather than customers. Similarly, restaurants in the B-to-C model claim to have the power to influence the CLD provider, as the B-to-C model relies on retailers in its core business model. Also, this power is legitimate as their claims have legal rights based on a contract between restaurants and B-to-C CLD providers and their claims correspond to values and norms within the social constructions. As the relationships with restaurants are important and critical to the B-to-C model, restaurants' claims are urgent to B-to-C and this influences the B-to-C CLD providers.

#### *5.2.2.5 Registration:*

Customers sign up through the application by entering their personal details. Drivers can sign up through the application without attending the registration process physically or undertaking a training programme, unlike with the B-to-B-Contract model. The instructions vary from one application to another. For example, a B-to-C driver explained:

> *"I use more than one application. All are the same in most of the steps, but they are different in a few things. First, you register your car and upload your driver licence picture, and they make sure that you are qualified and eligible to drive. Then, you wait for two days, then you will receive the acceptance and you can start working."* ATS Driver

Driver ATS illustrates that there is a type of following-up of drivers from the application to make sure their performance is acceptable. However, this is based on the customer reviews and ratings, as well as the number of orders accepted and rejected by drivers. Hence, this business model does not provide training for safety and quality maintenance, unlike the B-to-B-Contract business model. In terms of the rating system, it may be a value to customers and increase quality in a way, but it can create a barrier and conflict of interests with different stakeholders in terms of trust (will be discussed further in *RQ3*).

The registration requirements vary from one application to another. Some of them require a picture of a valid ID to be uploaded in the application and certain pictures of the car from both sides have to be uploaded as well. In addition, the car's year of manufacture has to be recent, no earlier than 2012. The registration requirements also reveal differences in the tracking of quality and follow-up of drivers, reflecting the differences in perspective between the applications on some of the conditions.

*5.2.2.6 Revenue Models for all parties:*

*Restaurants:*

The B-to-C CLD application provider takes 20% from the restaurant of the value of each order made through their application. This is described as an expensive but essential aspect by restaurant owner YL:

> *"The percentage taken is quite high at 20% of each order, but it is worth it, especially since you do not have to pay anything or fees if there are no orders made through them"* YL Restaurant Owner

In addition to that expense, there is a one-time installation fee, as YL explained.

It is clear, therefore, that the restaurants generate money from high sales made through the application. On the other hand, the B-to-C application provider generates money/revenue, from the restaurant based on the fee of 20% from each order. In terms of the money flow, the restaurant receives the payment from the driver, who is assigned to deliver the order to the customer, and then the application provider takes around 20% from the restaurant of each order made through the application. However, as BS explained, the percentage can be lower as there are different categories for restaurants in terms of the percentage taken, depending on the size of the restaurant and how big the name/brand is. Therefore, the money generated for the applications is paid through the restaurants' fees.

*Drivers:*

The application shows how much the driver should collect from the customer and how much he will pay the restaurant. This includes a delivery fee based on the distance. For example, ZIY, Driver of a B-to-C application model, described:

> *"A few seconds after I switch on the application on my phone, I receive an order. The order page shows the counting down time within which I should accept the order. Also, it shows how much money I will receive from that*

*order. If I do not want to accept it, I just leave it to someone else. I do not press the reject button, so it does not affect my orders-acceptance rate.* ***The delivery fees*** *specified by the application I am using are based on the distance between the customers' location and the shop I am going to collect the items from. The application provider does not take any amount from the delivery fees I receive from the customers."* ZIY Driver

ZIY continued:

*"The order comes to you as a driver and to any other drivers near the restaurant at the same time, and within a few seconds either you accept it or someone else will."* ZIY Driver

The ZIY quote illustrates that a driver has some control over the way that he works, but this is limited because of the competition. The driver gets paid based on the distance between the pick-up and drop-off points. Besides, the application provider does not take a commission or percentage of the delivery fee from the drivers. Therefore, their revenue model relies on restaurants/shops only.

### *5.2.3 Customer-to-Customer (C-to-C)*

#### *5.2.3.1 Naming:*

Customers request products from any shop or place using the application, and then the drivers purchase/pick up the items and deliver them on behalf of the individual customer. In other words, the application facilitates the delivery of anything and from anywhere in an immediate delivery process. The C-to-C business model matches two customers (the sender and the receiver), and the driver to do the Last Mile Delivery (LMD) task. Thus, it is a customer to customer type of business model. A C-to-C application owner explained the business model:

*"We realised that there is a problem people face in their daily life. People need items from shops that do not deliver, so we thought why don't we have a solution that delivers anything from anywhere? So this application simply links someone who offers a delivery service with someone who needs that delivery service. It is a pure C-to-C type of business model"* LA Application Owner

*5.2.3.2 Product flow path*

In the C-to-C model, first, the customer posts the shipment request on the CLD application, then specifies the pick-up and drop-off location using the application map. After both parties have agreed on the price, the one who makes the order (customer/buyer) and the one who is going to deliver it (driver) can both contact each other and chat through the application. *See* Figure 20.

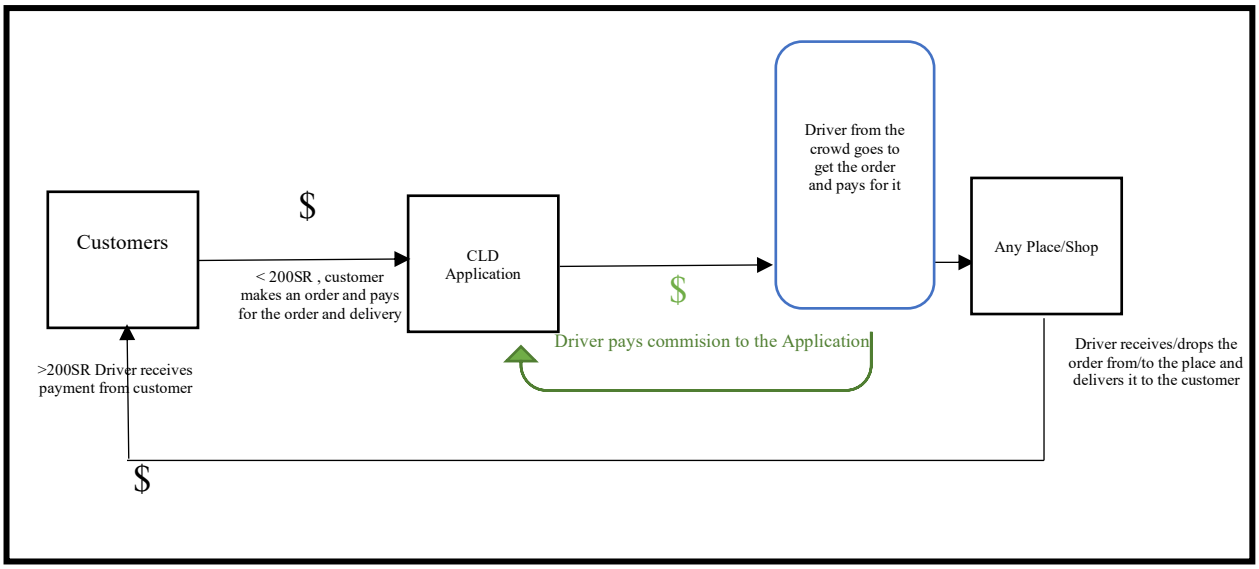


*Figure 20 C-to-C business model product flow path*

*5.2.3.3 Assigning drivers:*

Drivers will be assigned based on bidding, where the customer ultimately selects the driver that offers the most suitable delivery price for their request.

*5.2.3.4 Identifying the direct C-to-C stakeholders:*

The Customer-to-Customer business model connects drivers with customers, as direct stakeholders. Then, the driver contacts the customer to make any further arrangements that are needed, such as locations and adjustments to the orders. Thus, the Customer-to-Customer application is a 100% mediator between two individuals, namely the customer who is either sender or receiver and the driver who delivers and sometimes buys the items. The senders and receivers are individual customers and can include retail owners who want to deliver to a customer. Thus, the relevant and definitive stakeholders for C-to-C model are customers (sender/receiver) and drivers. Table 15 shows the relevant stakeholders to the B-to-C model as a stake.

*Table 15 Relevant Stakeholders to B-to-C model as a stake*

| | Relevant Stakeholders to the stake B-to-C model explanation | | | |
|---|---|---|---|---|
| **Stakeholder** | **Power** | **Legitimacy** | **Urgency** | **Type of sta** |
| **Drivers** | √<br>Able to influence the B-to-B-Contract model by his action (e.g. participation, or behaviour) | √<br>The driver's stake is aligned with his norms and beliefs. So, drivers have a legal and moral right to expect the application to satisfy their interests | √<br>Drivers' claims are time sensitive and drivers' relationships are critical to the B-to-B-Contract model | Definitive |
| **Customer (sender/receiver)** | √<br>Customers have the ability to influence the B-to-C model as they deal with the provider directly | √<br>Customers have the legal and moral right to claim, social- and norms- related | √<br>Their claims are time sensitive and B-to-C model cannot choose to ignore them | Definitive |

| | | | | |
|---|---|---|---|---|
| **Authorities (decision makers)** | √<br>Able to influence the B-to-B-Contract model decisions and conditions | √<br>They have the legal right to be heard | -<br>Claims are not time sensitive unless they become urgent. The relationship is not critical to the B-to-B-Contract model | Dominate |

*Drivers' role:*

Drivers receive a request through the application and make an offer to the customer. If the customer accepts it, there will be a chat window which allows them both to communicate if further information is needed.

*Customers' role:*

Customers describe the LMD task needed, whether to collect from a store or to pick up items and deliver them from one place to another.

*5.2.3.5 Registration*

The registration in the Customer-to-Customer model for both drivers and customers is quite similar to the B-to-C model. Both of these models have two key differences from the B-to-B-Contract model regarding the car models and the extra documentation, which may be a barrier for some potential drivers. In addition, the car must not be too old, as IND mentioned.

IND's explanation showed that there is a difference in waiting time until a driver gets accepted. In the B-to-C model, it takes up to two days until the drivers get accepted to work. Another difference relates to the care model, as ASL highlighted:

> *"Anyone who has a driving licence and owns a car made in 2011 or after can register. One of the conditions is that you must not smoke in the car. Also, the car has to have air conditioning. You must send pictures and video"* ASL Driver

*5.2.3.6 Revenue model for C-to-C model provider*

The C-to-C model employs a different way of generating revenue from the previous two models. Customers make an order and the drivers set an offer price (bidding) and customers then choose the price that is acceptable to them. After delivering the products/items, the customer pays the driver for the product plus the delivery fee. The application takes a percentage of the delivery fee from the driver. Therefore, the customer and driver negotiate the price and the application generates money from the drivers after a certain number of deliveries. For example, IND explained:

> *"I receive an order in my account and I post the price that I see as being reasonable for me. If the customer agrees on it, I start delivering.*

*Sometimes the CLD provider takes a third of the delivery fees and sometimes they take 25%"* IND Driver

Thus, the CLD application's revenue comes directly from the drivers by taking a percentage of the delivery fees.

*5.2.3.7 Payment model for drivers:*

The drivers get paid based on the price accepted by the customers, no matter whether they are a receiver or a sender (bidding-based model). The customer posts an LMD task on the application and the driver posts an offer for that task, and it is up to the customer to accept whichever offer he/she views as suitable. *The payment model will be explained further in the section 5.3.2.3.*

Table 16shows some of business models examples comparison inside and outside Saudi Arabia.

*Table 16 Examples of the business models inside and outside Saudi Arabia, along with their differences.*

| CLD Implementation | International | Saudi Context | Difference |
|---|---|---|---|
| B2B Contract | Amazon flex; Myways DHL (Europe—no longer active). | Company A | Registration method (attendance required); Payment method (fixed rate for drivers, customers not involved); Direct stakeholder involvement (e-commerce provider, LSP); Communication (calling on the way and upon arrival). |
| B-to-C | Deliveroo; UberEat; Trunkrs (Sampaio and Sampaio, 2015) | Company B | Communication method (calling customer services); Payment method (cash on delivery). |
| C-to-C | None | Company C | |

### *5.2.4 Summary*

Section 5.3 has met the first two objectives of the first research question. It illustrated how the crowd logistics delivery is implemented as a last mile delivery in the context of the Kingdom of Saudi Arabia (KSA) from different stakeholders' perspectives. It explained the naming of the different business models, products flow path, relevant stakeholders, registrations, revenue and payment models. As the stakeholders are different from one business model to another in the context of CLD, depicting business models is important to understand the rest of the findings. Section 5.3 also showed the differences among stakeholders in the business models in terms of their relevance and saliency. While stakeholders may be definitive and salient to one business model, they might be discretionary and not salient to another business model. A summary of previous findings of the previous section is provided in Table 17.

*Table 17 Summary of findings on different business models and stakeholders*

| Differences in business models' Implementation | B-to-B-Contract | B-to-C | C-to-C |
|---|---|---|---|
| **Product flow path** | Warehouse to customers' place | Retailers to customers' place | Anyplace to anyplace |
| **Registrations** | Attendance required | Online | Online |
| **Payment Method to the Drivers** | Distance-based<br>Fixed price | Distance-based | Bidding-based |
| **Products generator** | E-commerce companies<br>LSPs | Retailers | Any |
| **Type of agreement** | Contract-based | Contract-based | No contract (Matching individuals) |
| **Assigning drivers** | Availability | Near and availability | Best offer/bid |
| **Direct stakeholder involvement** | E-commerce company<br>LSP<br>Driver | Retailer<br>Driver<br>Customer | Driver<br>Customer |
| **Communication method** | Calling on the way and upon arrival | Notification upon arrival/calling customers services | Chatting through application |

## *5.3 Limitation and values of business models*

RO3) To explore the limitations of the CLD business models from the perspectives of different stakeholders

RO4) To explore how CLD business models create value for their drivers, thereby making them attractive for use as an LMD solution

Now that we have a clear understanding of the implementation of CLD in the three identified business models, we move on to address RO3 in the next section and RO4 in section 5.4.2. First, we will discuss the limitations of the business models stemming from their implementation and from the application owner's perspectives. Then we will move on to depict how a business model creates value for its stakeholders and thereby makes it attractive for the crowd to use. It is important to note that the section's scope is within the business models and does not extend throughout the CLD as a whole. Hence, the stakeholders' point of view is adopted within the business models.

### *5.3.1 Business models' limitations- unmet values:*

#### *5.3.1.1 Limited market:*

One of the main B-to-B-Contract CLD barriers is the market limitation. Market limitation refers to the limitation of delivery within the city only. This gives competitive advantage to the LSPs. Although there are some freight B-to-B-Contract CLD applications that specialise in delivering between cities, they are outside of the scope of this study. It is a challenging area as the LSPs are dominating the market and their main investment focus is on freight shipping. Therefore, delivering within the city is more advantageous for B-to-B-Contract CLD, but it also has the disadvantage of being a limited market. The application owner explained:

> *"The challenge is that today the LML that is relevant to the CLD is limited to inside the city. You cannot compete with big freight weight companies in between cities delivery. There are some CL companies in the freight weight field. For example, if you have a truck travelling between Riyadh and Dammam, how big is a 10-ton truck? Can I rent the free leftover capacity to other people?" Start-up… (Name of a person), his application is called (…). They do not work with individuals or with companies that have trucks; they link between the supply and the demand. So, the market is limited to*

*inside the cities compared with the market size available to the big LSPs."*
HD Application Owner

Thus, the B-to-B-Contract model has a limited market compared to that of the LSPs and other types of CL such as freight shipping/transport. That limitation mainly relates to the structure of the business model of the B-to-B-Contract CLD (see Figure 16 B-to-B-Contract Product Flow Path). HD explained this barrier:

*"If I am an e-commerce company owner and if I am going to do business with a CLD, that means it is just inside the city, because their distribution centre is centralised in Riyadh, for example. So, as a CLD company in Riyadh, I am limited to those e-commerce companies' distribution centres in Riyadh. So, this is one of the challenges of the market size, I only deliver packages inside the city. Hence, if an e-commerce company has 1000 orders to deliver in Saudi Arabia, I can only take a small number of packages, 10% or so, to deliver inside the city. While a big courier would say I will take all the packages in all cities, even rural areas, as I have branches, I have assets, and I have staff and connection as well."* HD Application Owner

The assets of LSPs give them more advantages in terms of having more volume and expansion. The B-to-B-Contract models rely mainly on the distribution centre for their operation. Hence, the expansion of the CLD B-to-B-Contract model is dependent on the location of the distribution centre, which limits individual companies' expansion and increases their difficulties in competing. As previously stated, therefore, users of the B-to-B-Contract model are recommended to forge more contracts with various e-commerce companies and LSP companies.

*5.3.1.2 Revenue sourced from a single stakeholder group:*

Both applications models have the chance to increase their revenue by expanding the number of stakeholders. For instance, the C-to-C model gets its revenue from one stakeholder source (drivers) only, while the B-to-C model generates its revenue from retailers only. In both cases the opportunities for generating more revenue are limited. The C-to-C model can expand by contracting with retailers, thereby gaining more sources of income while keeping the current model running. That may maximise the shareholder value from an economic sustainability aspect:

> *"It is very hard to expand and sustain with the current revenue model when your cut comes only from the drivers. We bring sales to retailers so should take another cut from them."* LA Application Owner

*5.3.1.3 Complexity:*

*Dealing with two groups of stakeholders:*

The B-to-C and C-to-C models deal directly with more individual stakeholders than the B-to-B-Contract model. B-to-B-Contract has two types of stakeholders: the individual (Driver) and the e-commerce/LSPs companies. Meanwhile, the B-to-C and C-to-C have individuals (Drivers and Customers) as main stakeholders, besides the industrial (Retailers) in the case of B-to-C. This may act as challenge to sustainability as there is the increased complexity of dealing with more stakeholders and keeping them all satisfied.

> *"Our business model is not easy, as we deal with drivers and customers and our main goal is to satisfy both at the same time. Unlike B-to-B they contract with a company and hire drivers."* LA Application Owner

Figure 21 shows the business models' limitations based on different business models' practices.

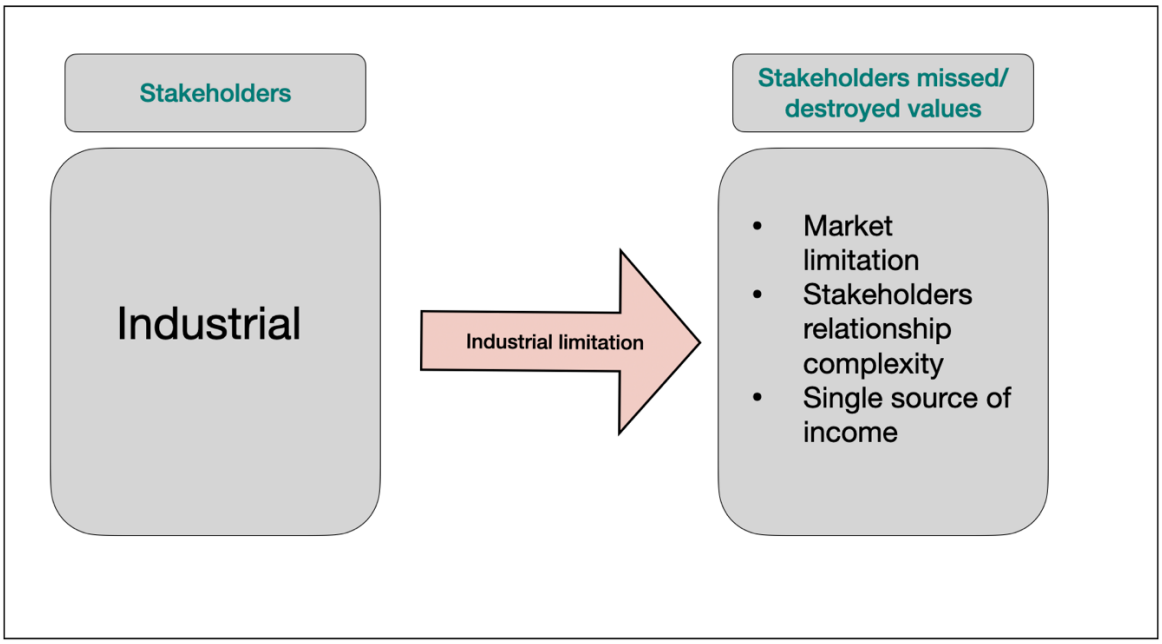


*Figure 21 Limitations of business models*

*5.3.2 Drivers' participations impact based on met and unmet values:*

This section attempts to meet RO4 to understand the values a business model provides to the drivers. Interviewees emphasised that these values are the reasons they participate in a certain business. These values are factors which, if met, enhance the crowd participation and hence the success of a business model as an LMD solution.

*5.3.2.1 Ease of registration:*

This section demonstrates how minor changes make an important difference in the registration for drivers' decision-making to participate in applications and business models. Interviews show that the registration plays a role in determining in which business model drivers choose to participate. Drivers assign value and tend to participate when the registration process is short and conducted online. This is not the case for B-to-B-Contract registration. In (B1) or (B2), despite the associated benefits, the steps the drivers have to take prior to becoming drivers, such as training or signing paperwork, etc., may act as a barrier deterring drivers from signing up, especially when other business models have fewer conditions and an easier registration process with almost the same/more income (will be discussed in the next sections). YSA explained the reasoning regarding switching to another business model:

*"In other applications, I do not need to attend to register. It is online registration, and they pay almost the same"* YSA Driver

IND highlighted that a lengthy or complicated registration process could deter him from joining other applications:

*"It only takes 24 hours to become a driver; other applications may take longer or you have to attend personally and train"* IND Driver

The registration process improves the quality of the application, as mentioned by the application owner. Consequently, the quality of the service will bring more customers and hence more orders and more drivers. However, the drivers interviewed highlighted that ease of registration encourages them to move to other business models and applications. Hence the drivers see the complexity of the process as a barrier compared to other applications (business models) that pay almost the same with less restriction. Therefore, if the application owners want to improve the quality and safety while keeping the drivers, they need to overcome this barrier by paying the drivers more than other applications and business models.

Another impact the registration may have on a driver's participation is the registration requirements, such as car standards. Car standards requirements, such as new car models will decrease the level of crowd participation. As previously mentioned by HD, they discovered that easing the strict requirement on car models to allow older vehicles increased the level of crowd participation. That met the interests of drivers and gained their acceptance.

#### *5.3.2.2 Orders assigning: Automated vs attendance check*

Automated assigning is the drivers' most preferred way for participating in a specific business model. Automated assigning comes in two forms as was previously mentioned in the implementation section: location-based (B-to-C) or offer-based (C-to-C). Both forms are acceptable for drivers. For instance, as mentioned earlier, (B1) connects the drivers using an algorithm and technology that helps them to be more efficient, as it will increase the number of deliveries. Besides, it will add value for the drivers because they will know the availability of the items to be picked up before moving there. Hence, it enhances their participation more than (B2). In addition, it makes a difference to the drivers, as they will know how much they will make beforehand. Meanwhile, the other model (B2) requires drivers to attend in order to check if there are packages to deliver.

MHS and YSA (B2) drivers illustrate the difficulties they face in the self-check assignment of orders, which is an obstacle for participating in this kind of model and application:

> *"I am using this business model only on the weekend when I am going back home. I check the warehouse on my way and grab the items I want"* MHS Driver

> *"The way of finding out the availability of items makes it not worth working there every day. I use it because I am going there anyway."* YSA Driver

In contrast, automated assigning will increase their willingness to participate, as it creates value for them, as highlighted by other driver interviewees, ATS, ZIY, and QH. As previously mentioned, there are two types of automated assigning, based on location of the drivers or the offer the drivers provide. Although drivers differ in their preferences for the two methods, automated is still more efficient for the drivers and better than self-checking.

#### *5.3.2.3 Payment model:*

The payment model is one the main factors in drivers' decision to participate and in making a success of the business model. Although payment models have been mentioned briefly in relation to the business models used in implementation of CLD, this section will discuss how the payment model impacts the drivers' participation decision. There are three types of payment model: distance-based (B1) and (B-to-C), fixed price (B2), and bidding offer (C-to-C).

##### *5.3.2.3.1 Distance-based vs fixed price:*

The drivers prefer the distance-based calculation method rather than the fixed-price method. With the fixed-price method, the drivers were found only to participate in that application if there were items close to the destination to which they were already travelling, otherwise, they saw it as not worth it. Another factor that emerges in relation to the drivers is the need to secure regular payments that do not fluctuate. The owner of (B1) clarified that the other types of models are confusing and that is solved by basing the payment for drivers on the distance the drivers travel. The second B-to-B-Contract model (B2) application adopts a fixed price system

regardless of the distance the driver travels to deliver. All transactions have a pre-determined price. As (B2) application driver MHS declared:

> *"The price is fixed at 8SR wherever you deliver, even if it is 50km outside the city. That is very low, especially since the gas prices are higher now. That is why I only deliver close by my place or on my way home, as the payment is the same. If it was based on the distance, I would deliver it to … (known city) on my way back on the weekend - 200km"* MHS Driver

The (B1) model is therefore preferable to the driver. MHS believed that under the (B2) model, delivering long distance, especially since gas prices had risen, was not profitable. This might have impact on the application business, as this type of charging model is not appealing to drivers. In general, drivers found the B-to-B-Contract model itself to be clear and reliable, as they know how much they will receive at the end of the day, based on guaranteed deliveries and payment. YSA driver used this model and explained:

> *"By having a clear payment that is based on the distance, I can estimate the income I will have at the end of the week by delivering a number of packages, which I find convenient."* YSA Driver

Thus, the payment model for an application can affect the number of drivers the application can recruit and retain, as some drivers prefer one model, such as distance-based versus fixed price.

Two factors, gas price and VAT, affect the drivers directly in terms of the amount they receive after delivery. Therefore, a distance-based payment model satisfies the drivers in that the further the distance the driver goes the more he will get paid. Besides, the (B1) application pays its drivers more. Thus, the drivers in (B1) are more satisfied and stay with the application; hence, this is one of the success factors for a model. Meanwhile, the (B2) application, with its fixed price structure, does not pay the drivers more to account for the gas price rising and VAT being applied. However, there are two reasons the drivers identified for using (B2) model. First is the closeness to the driver's neighbourhood area. Second is when the address on the parcel is on the drivers' route, as it is convenient to the driver. In contrast, under the distance-based payment system, the drivers do not mind working long hours regardless of the destination or the distance, as they will get sufficient payment. ZIY explained:

*"I would prefer it if the pay were higher, especially when the order is big, and you get the same amount for the delivery. However, this application offers more money than other ones because of the number of deliveries, it has more deliveries than other applications."* ZIY Driver

Although the B-to-B-Contract (B1) and B-to-C both have the same payment model (distance-based), the difference between the payment in B-to-B-Contract and B-to-C is the amount paid to the drivers. In other words, the amount is based on the distance but fixed to a lower price per km in the B-to-C model.

*5.3.2.3.2 Bidding charging models:*

The bidding price is the delivery price the driver offers for what the customer orders and the latter can accept it or reject it. On the other hand, the distance-based model price is automatically set by the application based on the distance of the trip. In this section, we will compare the advantages and disadvantages of the two charging models based on drivers' perspectives and supported by customers' perspectives for more clarification. The advantages are based on the values (benefits) the drivers receive. These values include the opportunity to raise and lower the delivery price, negotiation, and the advantage of far distance delivery.

Individual interviewees emphasised the benefit of price customisation that the C-to-C bidding model offers. The bidding model allows customers and drivers to have the best price possible at the time of ordering. The price the driver offers depends on the destination, the driver's current location, time of the order received (late night or morning), and the number of items for delivery and so on. This means that the driver can secure the optimum price and one that reflects his costs. ASL explained:

*"Once you receive an order you decide if you want to accept it or not. Once you accept it you enter the price that you think it is worth. After that, it depends on whether the customer likes the price or selects a different driver with a different price."* ASL Driver

Therefore, the drivers have the option to increase or decrease the price. Although this model offers the driver the chance to have a higher or lower price, the driver still has a chance to negotiate for a higher price after the customer accepts the order. Negotiation comes after accepting the offer. Negotiation occurs when the driver or the customer believes the price is still too high or low, so they can communicate after accepting the offer. This means that a driver

can earn more revenue based on the willingness of the customer to pay and their ability to pay. ASL Driver continued:

> *"You should make the price suitable for the customers while keeping in mind the time when the order is made, distance, and quantity of the order. So, when it is accepted, you still can negotiate on the price and get a little higher depending on the situation."* ASL Driver

However, there are situations when the driver may be obliged to take a lower price, which is the case if there are a high number of competing offers from drivers. Therefore, the negotiation on the price is a feature that the individual stakeholder finds useful and is an incentive to work with the bidding model. Simultaneously, customers have the opportunity to lower the price. This is especially the case if customers receive several quotes, as ABS Customer described:

> *"I have an item that I need to be delivered from A to B. I post the request online where I mention the pick-up point and drop-off point and wait for drivers to share with me their offers. After we agree, I can negotiate the final price. This way gives me the best price at the time"* ABS Customer

This point is also mentioned by different customers, HG and ED. Hence, the customers prefer negotiating until both parties come to an agreement. On the other hand, drivers see this feature as fair as long as they can secure higher prices depending on the situation. This advantage makes this model popular with both of the individual stakeholders, i.e. the drivers and the customers. MHF Driver gave an example of the benefit of the bidding system:

> *"I remember once I delivered to a town (a 45 minute drive), I put in an offer of 60 SR, the customer accepted, I delivered it and I came back. If it were for less than this amount, no one would deliver it, as it is long distance and not worth the gas you are using. Sometimes one town (an hour's drive), sometimes another town (an hour and a half)."* MHF Driver

Although the B-to-C model is based on distance, it pays a lower amount than C-to-C. Therefore, the bidding-based system allows both parties to have the amount they see as fair based on their agreement, which is one of the advantages of the bidding system. There may be instances where they receive unfavourable prices, but overall, the opportunity to offer a delivery price and negotiate is seen as a positive.

In addition, the bidding model allows the individual stakeholder more opportunity to have LMD service than the B-to-C model. The B-to-C model relies on location in assigning drivers for customers, while C-to-C relies on bidding offers for assigning drivers. To clarify this advantage, HG and the ABS example shared similar experiences of using C-to-C as LMD:

> *"I have only used … (C-to-C application name) once for urgent delivery of documents from Riyadh to Khobar (400km)."* HG Customer

Thus, the C-to-C payment model helps in acquiring more demand and supply, as retailers in the C-to-C model are not high in saliency and are not a definitive stakeholder.

*5.3.2.3.2.1 Disadvantages of bidding model for application owners:*

The bidding-based payment system influences the business model in different ways:

*A) Extra-earnings for drivers only (against Application Owners' interests):*

Although this is a limitation for a business model and impacts on the application owner, it is placed here as it is disadvantage of a payment model and for the purpose of coherence of this section. In other words, it enables better understanding of the payment model.

One of the big disadvantages of the bidding-based charging model occurs in cases of an informal agreement made between the customer and the drivers on the phone with regard to payment delivery. The amount can be greater than the one stated on the application; as an example of this, IND explained:

> *"I might offer a price that a customer will not accept, so that I can negotiate and deliver. It happened to me once, I received an order for a very large quantity to purchase from a restaurant, I put 45 SR as the max, but still this was not enough. It will take so much effort and I will get tired. Even though the two places were close to each other, but still, it was too much work carrying the items, putting them in the car. The back of the car was almost full of items. I called them and told them that the quantity of the order was too much, I negotiated with them until we agreed easily on 100 SR, which is more than double. So, if there is a feature without max limit, I can get more like this"* IND Driver

Although IND mentioned the positive aspect of negotiation, he also mentioned that there was an extra amount that they agreed on over the phone. This extra earning will go a hundred

percent to the driver, which is unfair to the application owner. Therefore, this feature could affect the overall revenue for the application. The owners of the application do not have full control of the negotiating process and this can result in the loss of revenue. The follow-up question for IND was whether the application could have taken any percentage of that extra amount that they both agreed on, and he answered:

> *"They only charged me on the offer I put on the application page in the first place. They never take any percentage from what I agreed with the customer over the phone."* IND Driver

That confirms that the application charges the drivers based on what they agree on the application and not the actual price agreed. The application owners can create a new feature of not having a maximum limit, which will allow the customers and drivers to have the price that is suitable for both without needing to do any negotiations over the phone which the application cannot control. Gaining more sales is one of the success factors that can be implemented through more control of the transactions.

BGT, another C-to-C driver, confirmed the positive aspects of negotiation, but also the lack of limitation of the negotiation, which again affects the application's income. As BGT described:

> *"I was able to negotiate and have more money than I expected, due to the feature of negotiation. I looked at the order and it was a large list of food. Therefore, I knew that they were a large number of people who would split the bill so they did not have an issue of price like that. The cost of the food was 700 SR, so I charged more than the original offer"* BGT Driver

The C-to-C application owner further highlighted this point:

> *"There are problems that I do not like to explain much, because I don't want to give the idea to people who do not know about it. However, in general, one of these problems arises from those drivers and customers who communicate outside the application chat. We track them and suspend them once we find out. Some drivers sign up again with different names, but they need to start over with a new review and rate. So, the drivers who do this will stop at certain point, as it takes effort to get back on track."* LA Application Owner

Although the customers and drivers prefer the bidding-based model to the distance model, which plays a role in their using the model as they see it as a value, some of the drawbacks of this payment systems go against both individual and industrial stakeholders' interests. However, the application owner can improve the bidding-based system by controlling it more effectively in the interests of all the stakeholders.

*B) Amount of money required to complete orders (against the drivers' interest):*

Another disadvantage of the current bidding-based system in the C-to-C model is the limited amount of money required per order for the driver to complete the delivery without going back to the customers. For instance, the driver has to go to the customer's location to receive payment when the order is higher than 200 SR; otherwise, the drivers have no chance of compensation in case of cancellation, which is one of the limitations of this model, see Figure 20. This condition makes the delivery inefficient and has implications for the economy and environment as well. Going back and forth costs the individual drivers and customers time and hence reduces the number of deliveries for drivers and increases the leading time for customers. In addition to the economic and social impacts, it also harms the environment, as the emissions increase with the number of trips and distance. The problem is caused by the cash payment system that will be discussed further in the *Trust section.* If the order is less than 200 SR, the driver will get the order, pay for the product and take a picture of the receipt, and receive the money from the customers upon delivery. Furthermore, the drivers sometimes do not have that amount of money to pay for the products that customers ordered, and so the driver has to contact the customers regarding whether to cancel it or go back and get the money from the customer, as MHF described:

> *"The order has to be under 200 SR. If it costs more than 200 SR, the driver has to go to the customer, pick up the money then go to get the order."*
> MHF Driver

When the amount is less than 200 SR, he continued:

> *"If it is less than 200 SR they pay for it. They keep the receipt, then provide the receipt to the customer and collect the amount for the items ordered plus the cost of the delivery."* MHF Driver

This is an issue consisting of two parts: the first is the cash on delivery rather than online payment and the second is the amount limit restriction. Drivers interviewed preferred to have a higher amount limit – more than 200 SR – so as not to waste time, fuel, and energy in going back to the customer to get the cash, as MHF explained:

> *"I would like them to extend the amount, so the driver can go and buy the product without going back to the customer."* MHF Driver

Customers, at the same time, see this feature as increasing the leading time, and suggested increasing the limit amount as a solution. MAL mentioned:

> *"I think there is nothing wrong with extending it to five hundred, for example, because some drivers have that amount and it will save us time as customers"* MAL Customer

Therefore, to remove this potential barrier in the bidding-based system, lifting the limitation of the amount required per order should be considered in order to improve the charging model. This will result in increased satisfaction for the drivers and customers. Moreover, it will improve the efficiency of delivery by not wasting the drivers' time, fuel, and energy, and will avoid increasing the customers' waiting time. This disadvantage can negatively affect the model's success over the longer term.

*C) Impact of drivers offering too low a price: against the other drivers' interests*

One of the main issues the bidding-based system faces is that some drivers, who have registered with a CLD, want only to socialise and offer the lowest price possible to make sure of getting the order, not needing to maximise the money they earn. Meanwhile, customers will always prefer a lower price. IND made the point about drivers that work there for non-monetary motivation by saying:

> *"Some drivers' intention is not to get extra money, but to socialise through this application. For example, they might offer 5 SR as the minimum, which will affect me as a driver. I cannot offer that low a price for any order. In the end, the customer is a winner too."* IND Driver

This could influence the other drivers' income and the overall application success, as getting a decent income is considered a success factor in retaining drivers. An example of that is IND's perspective:

> *"There are some nights I cannot work, so I turn the application off or switch to other applications I am registered with. The reason is rogue drivers whose intention is not to get extra money but just to socialise. So, they offer the lowest price possible"* IND Driver

MHF is one of the drivers that sometimes does not work for monetary rewards *(this will be shown again in RQ2 answers).* MHF stated:

> *"One of the things that I do not like in my personality that I am not an outgoing person and shy sometimes so I would like to overcome these issues by using these applications, which give me a chance to talk and communicate with people and improve my communication skills. However, the main thing is the extra income and then to socialise when I am bored late at night by accepting orders."* MHF Driver

This point also was mentioned by BGT driver as a disadvantage of this model.

To conclude, the payment model in the business model implementation plays a large role in making the CLD application successful. Although each payment system has its strengths and weaknesses, improving the payment model contributes to the overall success of the business model application. In the case of the bidding-based model, customers enjoy having an opportunity to negotiate, and drivers like the feature of raising and lowering the price based on time, distance, and demand. Hence, there is a perception among both customers and drivers that this is the best model for them. However, as a drawback, application owners often lose out because they are unable to control the process. In addition, with the bidding model of charging, limitations arise when it comes to the collection of payments. Therefore, considerable improvements are needed in order to keep and attract more drivers and be successful, such as increasing the amount to be paid by customers. On the other hand, the distance-based model is the best for drivers in terms of covering the travelling distance cost. However, as it ignores other factors like the time of day the order is made and the current status of the supply and demand, the price will not be always convenient for drivers and customers, especially if the store is not close by. Simultaneously, the price may not be suitable for customers if the delivery fee is higher than the value of the product delivered. Meanwhile, the bidding system has potential to attract more drivers and customers, as it is not a location-based type of model.

However, the current payment and charging models indicate that there is a need for improvement.

*5.3.3 Compensation:*

Compensation is a part of the trust issue that affects all business models in CLD, as stakeholders see trust differently in the LMD context *(as will be discussed further when answering RQ3 in section 5.7.3.1)*. In this section, compensation will be discussed from the drivers' perspective as it affects their participation. Payment upon delivery increases the probability of customers cancelling orders. Compensation has been mentioned frequently in drivers' interviews as a factor that impacts on their participation. Inadequate compensation upon cancellation, whether from customers or for any other reasons, leads drivers to lose pay from their own pockets. In other words, a lack of compensation means that drivers work not only for free, but they also lose the trip cost plus the amount they pay to the retailer. IND explained:

> *"I say you have to be satisfied with the compensation they might give you, but do not ask too much because you will not get exactly what you deserve, especially if it is very expensive package. So, just accept whatever they provide as compensation"* IND Driver

CLD applications vary in terms of providing compensation for drivers. In the B-to-C business model, the application provider compensates drivers in cases of cancellation, and drivers do not have to return items to the retailers/restaurants. The point about customers cancelling was mentioned by an application owner as one of the factors that affect their success. However, it was highlighted by the drivers as enhancing participation in this model. As a B-to-C application owner explained:

> *"The number of cancellations affects the revenue and costs us more because we compensate the driver immediately the request is raised. The customer's rate will be impacted negatively because of that*." BS Application Owner

ZIY and ATS B-to-C drivers highlighted the same concept as QH:

> *"This application guarantees your money back when there is any cancellation by the customers. Other applications do not compensate me. When customers cancel, they let you return the items and you get a refund only if the retailer agrees to it"* QH Driver

Compensation is a major concern for a driver in terms of choosing an application or business model. In the C-to-C model this feature is scarcely applicable for drivers in the way that it is for B-to-C drivers.

In the C-to-C business model, as previously mentioned, the application provider is a 100% facilitator that connects two individuals for LMD tasks. Due to the payment upon receipt (cash on delivery), the driver pays from his own pocket, so the risk is high for the drivers. Hence, the compensation rule enhances the application's reliability and success, which increases the drivers' and customers' usage. BGT highlighted:

> *"People order and then cancel the order after you have paid for it from your own pocket. The risk is very high, which means that you sometimes reject high priced orders"* BGT Driver

MHF also illustrated:

> *"The cancellation is always a threat in this business model. It is hard to tell when the customer will cancel, and when he/she does, you cannot get your money back. I avoid complaining because any compensation will not be worth more waiting"* MHF Driver

The issues mainly related to the cash on delivery rather than online payment. Apart from addressing the whole cash on delivery issue, the findings show that the business model should make sure that at least their drivers do not have to pay from their own pockets, and so lower their risk in order to sustain and recruit more drivers. Figure 22 shows a summary of how the bidding-based payment model impacts on drivers' participation based on their met and unmet interests. Figures 22 and 23 present the conclusions of this section. In particular, Figure 23 shows the factors that attract drivers to participate in a specific business model. Drivers mentioned the limitation of the business model they work on and what could limit them from participating. Therefore, Figure 24 shows where the limitations of different business models come from. In addition, it shows the limitation of each business model from the application owners' perspectives. However, Figure 24 also combines all these factors from individual and industrial perspectives to arrive at factors that CLD business models have to work on within the business model in order to succeed. The later section, 5.5.5, provides the overall factors for drivers' participation internally and externally. External factors are those affect the CLD in general regardless of the business model, as agreed upon by the drivers from different business model; in other words, from a mutual point of view.

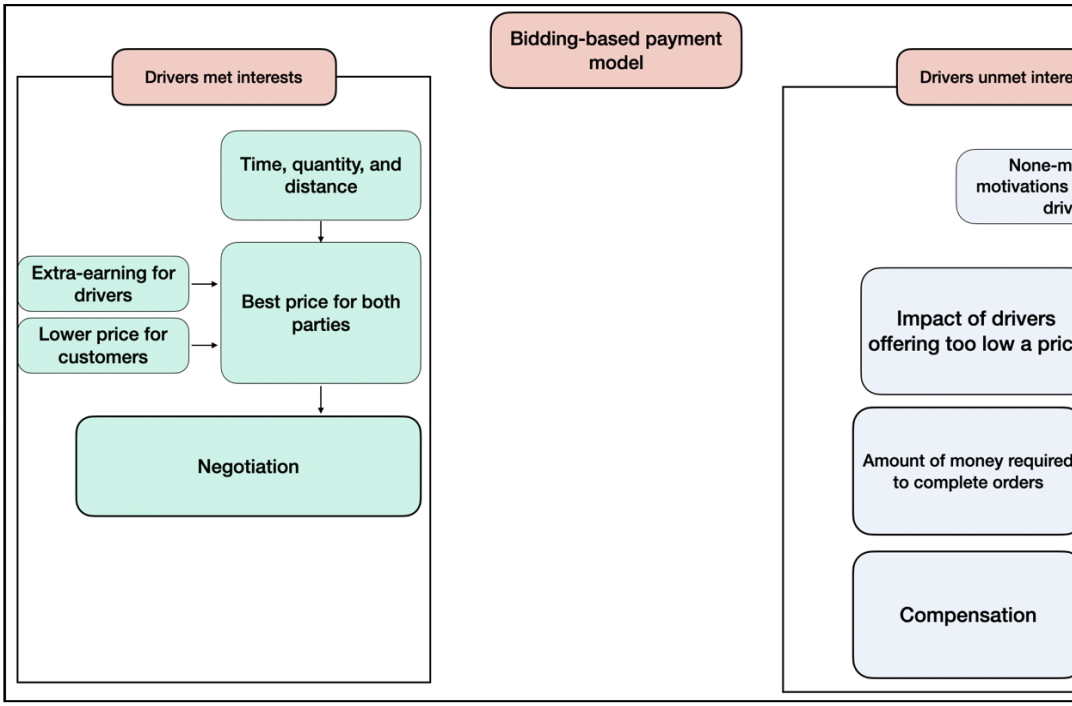


*Figure 22 Bidding-based payment model's impact on participation*

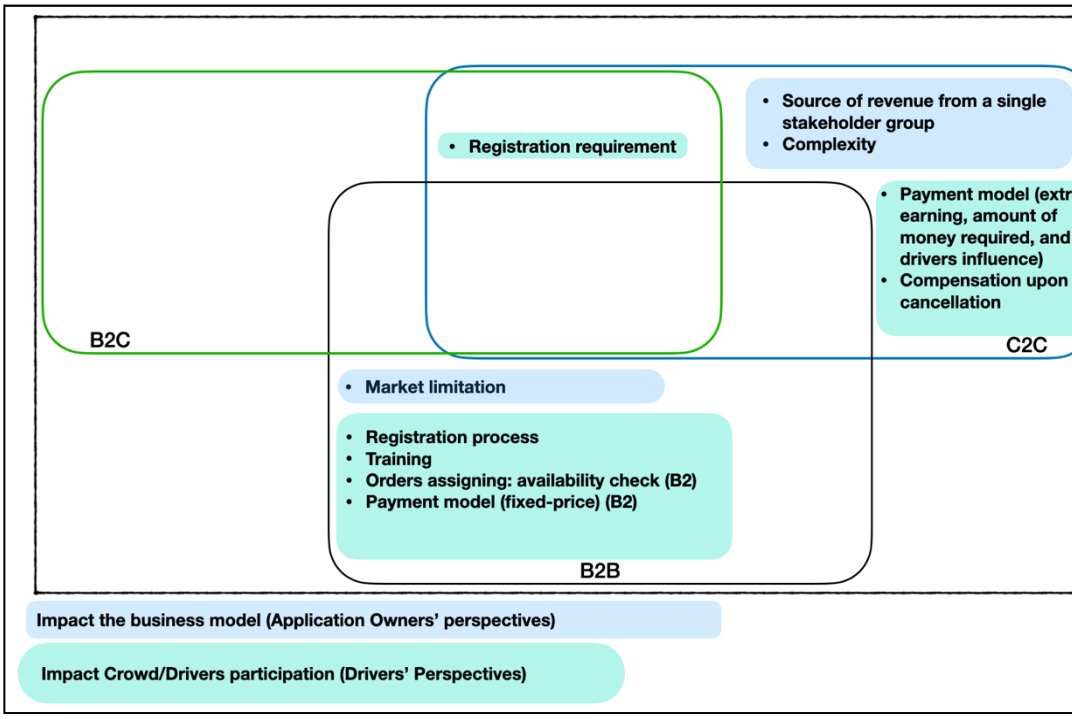


*Figure 23 Industrial and Individual perspectives on limitations*

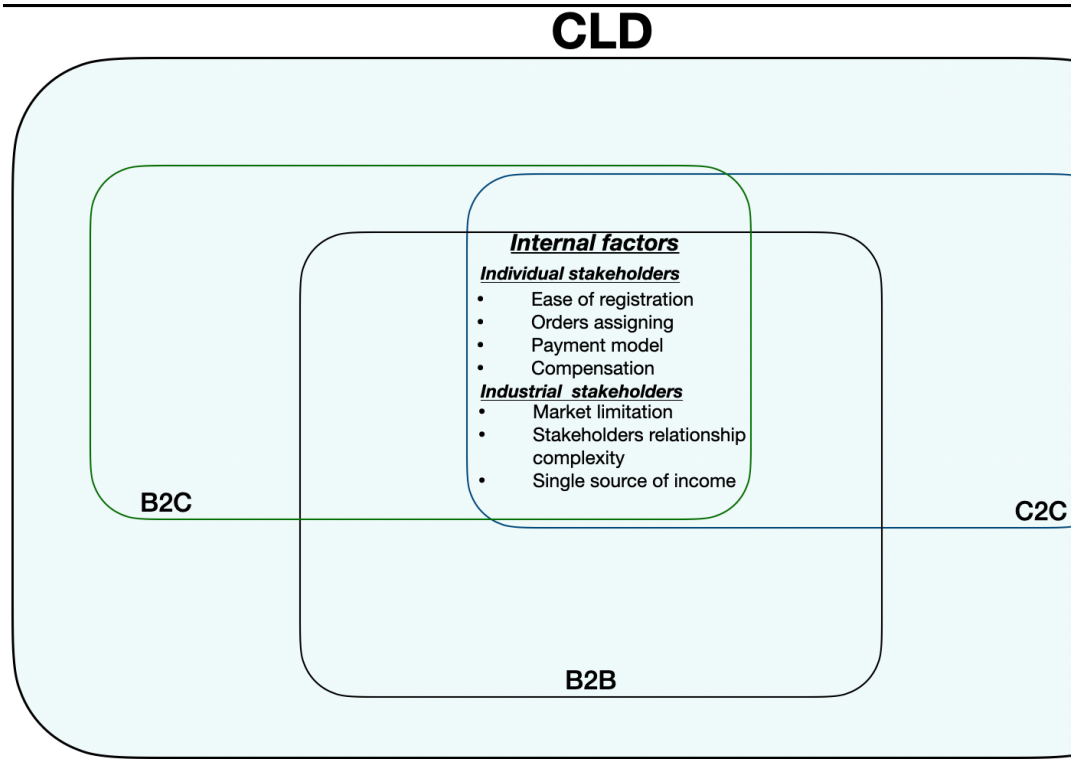


*Figure 24 Internal factors within business models*

## *5.4 Stakeholders' motivations to use crowd logistics as a last mile delivery solution:*

### *5.4.1 Introduction*

After identifying the implementation and stakeholders of CLD, this section answers RQ2 to find out the motivations based on the values and benefits that the identified stakeholders defined. These values are factors that influence crowd logistics growth. While the RQ1 provides answers to the implementation and met and unmet interests of stakeholders that impact the success of a business model, RQ2 reveals the factors contributing to CLD success as a whole from different stakeholders' perspectives.

This section investigates the following research question and its objectives:

### *5.4.2 RQ2 recall:*

*RQ2) Why do engaged and identified stakeholders in different business models use CLD as an LMD solution?*

RO5: To explore how potential synergised values among different stakeholders lead to the use of CLD as an LMD solution

RO6: To explore in what ways the stakeholders are motivated towards using CLD as a sustainable LMD solution

Section 5.5.3 begins with identifying the address issue, which is the main LMD issue in the Saudi Arabian context and describes what current LSPs practices are used to cope with this. Stakeholders revealed that the address issue is one of the main obstacles they used to face prior to the introduction of CLD. Hence, it is vital to deal with LMD address issues before moving on to the values. Then, sections 5.4. – 5.5.5 will attempt to meet RO5. The last section, 5.5.6, details the findings of RO6. A brief summary/overview of the findings on the two themes of RQ2 is presented in Table 18 and Table 19

*Table 18 Summary of findings on theme of LMD-related benefits*

| Values the stakeholders mentioned (answer the why question) | Stakeholders affected | |
|---|---|---|
| LMD-related benefits (Theme) | Individual:<br>Customers & drivers | Industrial:<br>Application owners, retailers, and LSPs |
| Solved Address issues | √<br>Benefited customers and drivers stakeholders in many ways, such as complexity and communication issues: cost and language barriers | √<br>More efficient deliveries, higher number of deliveries, easier way to locate destination, delay, and repeated visit |
| Sharing location and Real-time tracking | √<br>More transparency and less leading time for customers and faster to reach destination for drivers, and gained customers' trust. | √<br>Increases the efficiency as well as the service quality, allows easier accessibility to remote and rural areas |

| | | |
|---|---|---|
| Speed of delivery | √<br>Faster receiving for customers and more deliveries and income for drivers | √<br>More deliveries and high turn-over, lower inventory cost |
| Drop-off flexibility | √<br>Solved the unattended home delivery issue for both customers and drivers | √<br>More flexibility that overcomes the geographical limitation and unattended home issues. More deliveries and high turn-over, lower inventory cost, less reverse logistics |

*Table 19 Summary of findings on theme of CLD's impact on society*

| Values stakeholders mentioned (answering the why question) | Stakeholders affected | |
|---|---|---|
| CLD impact on society (Theme) | Individual:<br>Customers & drivers | Industrial:<br>Application owners, retailers, and LSPs |
| Enhance the community | √<br>Customers' support for drivers in part-time jobs and personal level skills for drivers | √<br>Training and hiring |
| Lower price | Customers √<br>Lower price for customers, which increases demand and benefits drivers | √<br>Light assets contribute to have lower price for individual and retailer's stakeholders |
| Source of income | √<br>Drivers' income and customers' support because of jobs creation | √<br>Create Income for all industrial stakeholders and for retailers a wider sales channel |

| | | |
|---|---|---|
| Accessibility | Customer√<br>Ease of use, time saving and gives customers control over their orders and deliveries. | √<br>Create more sales and quality control |
| Transportation opportunity | √<br>Customers without transportation, females who do not drive mainly, accessibility for customers to different retailers during busiest time, late time, and far distance | √<br>Provide accessibility to different retailers and different customers. |

*5.4.3 Identification: Application owner as a CLD Stakeholder:*

*Table 20 Relevant Stakeholder to the stake*

| | Relevant Stakeholders to the stake CLD explanation | | | | |
|---|---|---|---|---|---|
| **Stakeholder** | **Power** | **Legitimacy** | **Urgency** | **Type of stakeholder** | **Saliency to CLD** |
| **Application owner (CLD service provider)** | √ Able to influence CLD by his/her action (e.g. changes the conditions or business model) | √ The application owner has the legal right to be heard | √ Application owner's claim is both time sensitive and relationship critical to the CLD (the stake) | Definitive | High |

As the study looks at the CLD case rather than multi-cases, the application owner is a definitive stakeholder to the CLD. Without the CLD service provider (application owner), the CLD will not work. In the previous section, the previous RQ identified the stakeholders for each business model in the context and their saliency to each business model/application. The application owner may be able to influence the CLD in various ways (e.g. by changing business models), but also has the right to claim and to be heard, and his relationship to the CLD as a last mile delivery (LMD) solution is critical and time sensitive. Thus, application owner is a definitive stakeholder of high salience to the CLD. See Table 20. Now, when we look at the CLD as a big picture, we consider the application owner's answers to some of the questions related to the CLD rather than the respective model/application.

### *5.4.4 LMD-related benefits:*

The data revealed that the delivery address is a major issue faced by stakeholders in the last mile field. This issue enhanced the value of CLD for the interviewees and consequently emphasises the importance of CLD.

#### *5.4.4.1 Delivery address issues:*

Same-day delivery is an attractive option for many people these days. However, this is not as easy for people living in areas where postal codes, street numbers and names are not used by customers and drivers. Such drawbacks in logistics regularly lead to delivery problems. This explains why a large number of parcels are sent back to the shipper with a label on them saying that the location was not found, even in urban and affluent areas. This problem originates from issues in the address infrastructure.

Interviewees highlighted that the main issues related to the address are caused by different factors affecting stakeholders at an individual, institutional, or industry level. Besides, various stakeholder factors contribute to address problems relating to such as the complexity of the address, language barriers leading to spelling and communication issues, customer and driver awareness of using the delivery address, and e-commerce companies' websites. Hence, these issues caused several problems in terms of last-mile delivery. Some of these problems led to increased communication cost, inefficiency, delay, and returned items.

The interviews also showed that the address issues can clearly be linked to lack of stakeholder engagement. Below the address issues will be discussed from different stakeholders' perspectives.

#### *5.4.4.2 Complexity and language barriers:*

This subsection will discuss the address issues represented by the complexity of the address and the language barriers along with the role of stakeholders in these issues. Then, subsequent issues that occurred because of the address issues will be highlighted.

Recently, the Saudi Arabian government has made great efforts to improve the situation caused by address issues by enabling any location in the country to be identified to an accuracy of a 1-metre square. This is called the national address. The address consists of six different pieces of information that need to be combined to be able to identify a place. These are the building number, street name, district name, city, postcode, and the Additional Number. Besides, the

Unit number is required if the address is an office or apartment in a building. The postcode contains five figures, and the Additional Number contains four digits. ZH, a decision maker in addressing infrastructure, and SB, a decision maker in National Address highlighted:

> *"We made the addresses more reliable by doing the national address project, and we are able to identify any 1 metre square in the kingdom by having the national address, even in the desert"* ZH Decision maker in addressing infrastructure and SB

During the interviews with different stakeholders, interviewees blamed different stakeholder groups as being responsible for the issues of delivery address. Thus, the section below highlights the role of each stakeholder in adding to the problem.

*Customers' role:*

Lack of awareness from some customers of how to use an address plays a role in making the address delivery issue more complicated. For example, there are some customers who put a random address on parcels when using online purchasing or the delivery form for LSPs. Another issue is the requirement to use the English alphabet to spell Arabic street names and districts, which leads to spelling mistakes and communication difficulties with the driver/delivery company, especially if the receiver or driver does not have Arabic as their first language. This issue affects both individual and industrial stakeholders. The application owner explained:

> "*The addressing infrastructure is an issue. The national address system contains four digits plus street name, plus area name, plus zip code, plus four more digits. It is hard to remember. So, drivers use WhatsApp with customers to share locations."* HD application owner

SMN explained the importance of drivers' communications to locate the delivery location:

> *"Drivers call when they are on their way. The delivery cannot be done without receiving a call from the person who is delivering, as the location has to be accurate."* SMN Customer.

Customers, meanwhile, see the address issue as a major concern in terms of being time-consuming. DGN highlighted his experience with LSPs in relation to address issues:

*"You wait for the driver outside after describing the route and directions to him to make sure that he does not get lost and go to a different house."* DGN Customer

Another customer emphasised that this issue is mutual to different stakeholders:

*"There is an address system, but most of us do not know how to use it as there are too many numbers and we do not know if it is activated or not and most of the drivers for restaurants and groceries when they deliver do not ask for it or know how to use it"* ADL Customer

The address infrastructure issue became even more pronounced in relation to females. The fact that females were not permitted to drive before 2018 (*will discuss in the section on social values CLD provides*) has made it more difficult for them to navigate drivers to their location. Furthermore, due to cultural restrictions, females cannot go outside to wait for or navigate the driver either (*will be discussed further in the culture section*). However, the location accuracy the CLD provides prevents these kinds of issues from occurring. A female highlighted:

*"As a female, I do not have enough knowledge about routes; therefore, I was forced every time to get help from someone else or get to know the routes clearly before making a request."* UF2 Customer

*Drivers' role:*

The issues with the address infrastructure have led to drivers taking an entirely different approach. Some drivers do not rely on addresses but instead directly contact the customers to share their location using different applications like WhatsApp, which uses personal numbers. Driver MHS clarified:

*"I am not going to waste my time and follow an address that is not correct. I directly call the customer to see where his/her place is"* MHS Driver

Note that MHS is a driver for (B2) which, unlike (B1), does not provide customers or drivers with *real time tracking (next section)*.

On the other hand, from the perspective of the LSPs, WF highlighted the address issue along with other issues:

*"The problems we have with customers in delivering are many. No answer, they do not pick up the phone. Sometimes the location is wrong. Sometimes*

*in e-commerce, the product the customer buys is not the same in real life, so we have a lot of reverse logistics"* WF Local LSP Manager

This leads to discussion of the role of e-commerce.

*E-commerce's role:*

Other stakeholders, such as drivers and e-commerce, play a significant role in increasing inefficiency in the delivery process by putting on/allowing the wrong address. In terms of e-commerce, for instance, RA explained:

*"E-commerce companies try to get purchases from customers regardless of the accuracy of the address details, and then they leave this headache to the LSPs. E-commerce companies worry that when the customers see the address page, they will not complete the orders. So, they do not care about the address part, which leads to customers not putting the right addresses. That is caused by customers' lack of awareness and e-commerce not fixing it as well."* RA Int. LSP Regional Manager

This point, mentioned previously by an application owner, has its root in the addressing infrastructure. The address numbers and names are not used due to the long numbers that are difficult to remember. Moreover, the difficulty of memorising all those numbers and names due to their length led to a lack of use of addresses and made individuals believe that the addresses were not activated.

*Results*:

Thus, issues with the addressing infrastructure identified by stakeholders led to increases in last-mile problems for LSPs before the CLD saw the light. Problems of inefficiency, communication costs, and delays occur. As a result, during the delivery, two scenarios, from the customer and driver end, usually occur that cause inefficiency as well as customer and industrial dissatisfaction. First, when customers call the delivery company or retailers asking about the driver's current location and whether he is close to their place or not, the company then contacts the driver to make sure he gets the location right. Second, when the driver calls the customer to locate their place, then the customer has to navigate the driver to the house. Here, apart from the inefficiency that this may create, there may be a communication issue that also leads to communication cost relating to the address. RAJ explained:

> *"The address is an issue even when there is communication with the driver of the LSP company, as most of the time the driver does not speak Arabic, which makes it even harder to explain where my house is*" RAJ Customer

RAJ's claim supports the idea that there is communication between drivers and customers. This leads to increased cost. Thus, the LSP companies require the driver to record the customer's location in their database for future delivery when they deliver to this address for the first time, to avoid additional cost and delay. However, while this saves LSPs time in future deliveries, it also causes inefficiency in the delivery process. A LSP manager highlighted:

> *"We face difficulties in recording new addresses in our database and it causes an increase in the communication cost."* RA Int. LSP regional Manager

Another way is to use the method employed by one of the CLD applications, namely the WhatsApp chatting application, asking customers to share their location. This step did not meet with some customers' acceptance, due to privacy issues. RA explained this:

> *"We try to take the customers' locations through WhatsApp. When the location is sent to the driver's WhatsApp phone number, it will stay with the driver, but when the driver arrives at the customer's place and updates the location in the system, the address will be saved in our database. Customers complain when we call and ask for locations that we do not know."* RA Int. LSP regional Manager

LA application owner commented on the address issue and shared their customer experience:

> *"The worst moment is when a driver calls or texts the customer to ask them to share the location. They have the address on the label of the package but no one uses it, so they always call you as a customer to share it on WhatsApp. Customers hate it nowadays, I hate it"* LA Application Owner

This indicates that LSPs have their own ways of solving the address issue, such as having their own database that gets updated by the drivers when they arrive at a new address. Hence, it has been found that while different LSPs have different ways of facing the issue. On the one hand, their address systems require considerable improvement, while, on the other hand, the industry needs to provide solutions.

In rural areas, the awareness and usage of addresses is even lower. In these areas, LSPs drop off the items in their offices, then call/text customers to pick them up.

For urban and rural cases, therefore, the address matter leads to inefficiency, and that harms the last-mile process. When the last mile is performed efficiently, retailers are rewarded with savings and buyers experience a convenient transaction.

Innovation and the sharing-economy concept have led to the provision of CLD, which helps customers to have more features and more values than offered by the traditional delivery service. As the owner of a CLD application stated:

> *"The problem with LSPs is that they are not up to date with technology like addresses, for example. Here, it is hard to remember the full address"* HD Application Owner

To summarise, different stakeholders contribute to the problems with the address infrastructure. These problems are caused mainly by a lack of stakeholder engagement. As all interviewees blamed other stakeholder groups, there is a vital need to engage stakeholders in solving the problems, in decision making to understand the issue and then to solve the address issue. The issues include the address complexity, language barriers, customers and drivers' lack of awareness, and e-commerce's resistance to obtaining accurate address details from customers. The highlighted problems are of considerable concern for stakeholders and result in inefficiency in both urban and rural areas, communication cost, delay, and rise in reverse logistics. Figure 25 summarises the address issue.

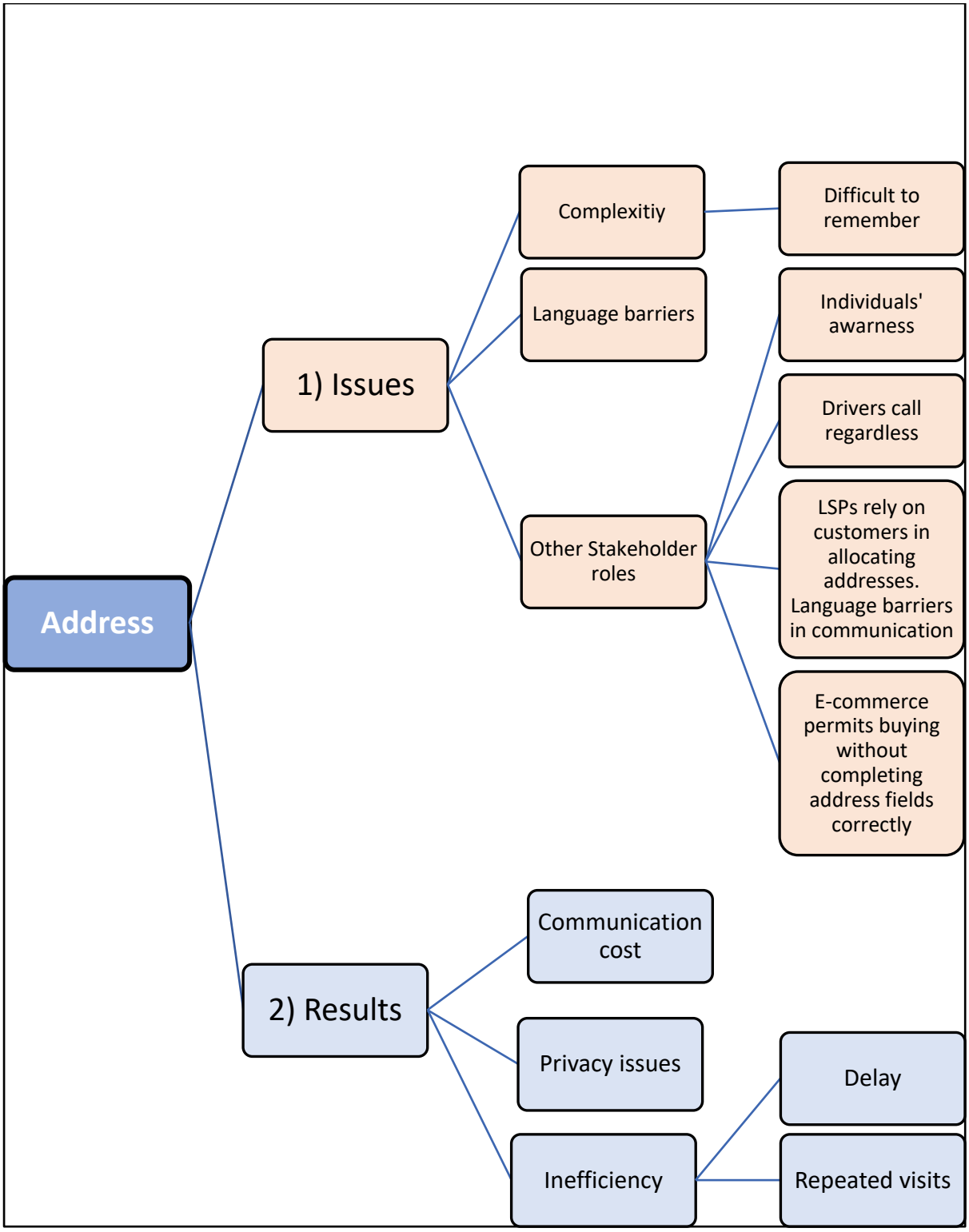


*Figure 25 The issue of address*

After interviewees revealed the issues of address in the context, it became easier to understand the benefits that CLD provides to its stakeholders as an LMD solution. The next section, in meeting RO5, provides insight about the synergised stakeholders' values and interests that CLD addresses.

*5.4.4.3 Sharing locations and real-time tracking:*

Sharing locations and real-time tracking are two of the most desirable features for customers and important features in the last mile logistics industry as they can influence the efficiency as well as the service quality. These two features become even more important and game-changers if the addresses are not well used for the reasons mentioned above.

Sharing of locations by customers and real-time tracking provided by CLD give transparency and benefits to individuals in urban and rural areas, solve address issues, and result in increased levels of customer trust. LSPs are not using these features.

Sharing of their location by customers occurs once the purchase is completed on the application. The customers will then be able to identify their current destination on the application map, without needing to add an address. Next, real-time tracking will be made available to the customers so they can track/follow the items (live) when the delivery takes place as well as for drivers to track the drop-off point. Real-time tracking allows more transparency in providing an almost accurate arrival time and more reliable information to customers. Consequently, the increased value becomes a reason for customers and drivers to use CLD as an LMD solution. This gives customers more confidence and trust in using the CLD. HG explained:

> *"The application shows all the information needed about the delivery, such as lead time, name of the person who is picking it up, sometimes his contact number*" HG Customer

Customers have the option to indicate their location using the map, also it avoids the confusion caused by the address issue, as the driver can track the customer's location on the map rather than using a specific address. Furthermore, it has huge advantages for customers over traditional deliveries, as they now no longer have to describe the routes to the driver and as such communication costs can be reduced. ABS explained the difference between the CLD solution and the traditional one:

> *"It is such a very nice solution after having used the old ways of waving, using our hands to stop the car that was delivering the package. Or when the restaurant's driver would give me a call, as he did not know the area,*

*so I put in so much effort just to navigate him to my place. Now I just share my location through the application."* ABS Customer

On the other hand, the LSPs' customers do not enjoy the same benefits because this feature does not exist in the last mile delivery using LSPs. According to the customers interviewed in this study, this is a huge drawback, and they can no longer deal with estimates of the delivery time and other false information about the delivery or the headache coupled with destination allocation. Therefore, uncertainty over delivery times has become unacceptable for individuals. FMG confirmed the benefit of the transparency of delivery:

*"When the driver arrives later than the times shown, the driver will lose some points. I will give him a negative review and bad rating if there is no good reason for being late. The app itself gives you the time range depending on the distance between the customer's location and the restaurant or another place, so the driver should stick to it"* FMG Customer

FMG's perspective illustrates how customers' expectations have been raised by CLD in terms of the delivery time, the accuracy of the information, and the short time windows compared to the four days delivery time or customers being asked to pick items up from the office, as was the case with LSPs (this point will be discussed further in the *speed of delivery* section). ATS highlighted the benefit for drivers of sharing the location:

*"Tracking the customers' locations on the map made the delivery way easier by improving navigation"* ATS Driver

The LSPs have a tracing feature that allows them to trace the item's moving phases, such as from the warehouse and the assignment of different employees and drivers to certain items. Additionally, LSPs provide their customers with a tracking number that they can use on their website to receive an update about their packages. The CLD provides the same value. Besides, LSPs notify their customers when the package moves from the origin to the final destination. However, the LSPs inside the city, in the last mile delivery, do not provide the sharing location and real-time tracking features that customers mentioned with CLD. As WF, manager of an LSP, stated:

*"We have in … (name of the company) full tracking of packages, from when they enter the country until they get to the final customer. The*

> *packages go through many moving phases. In each phase we know who is carrying it, I know which employee checks it, and who takes it."* WF Local LSP Manager

LSPs, however, do not provide live tracking to customers as a transparent way of providing the lead time or map tracking of the customers locations for drivers.

HG stated in comparing the two services:

> *"Tracking, tracking, tracking. Knowing the estimated delivery time gives CLD the edge over the traditional delivery methods, in my opinion"* HG Customer

As previously mentioned, a problem that arises from the address issue is the situation where parcels cannot be delivered, and customers have to collect their items from the LSP's office. The strategy of some LSPs is to notify the customer of the arrival of their item at the warehouse, and to provide them with the tracking code for them to come and collect it from the office. For example, HG explained in this regard:

> *"When I purchase from e-commerce, I receive a text message from the LSP that my package has arrived and is ready to collect, whether from the main office or the branches. Sometimes I go to more than one office asking for the package. Other companies deliver to my place."* HG Customer

As indicated previously, having the location sharing and real-time tracking features in the applications allows customers and drivers to have full transparency regarding estimated time of arrival as well as easier navigation. Hence, CLD has provided better solutions to the address issues. Moreover, CLD allows individuals, even in rural areas, to have access to more and a greater variety of shops and products outside their areas for them to purchase and to have delivered to the doorstep. QH explained:

> *"CLD is also beneficial for those who are in a remote area for a picnic or something, they can use these services."* QH Driver

To conclude, the complexity of the address infrastructure created a need for drivers to use chatting applications, such as WhatsApp and Google Map to share location. Location sharing and real-time tracking features in CLD applications provide stakeholders with LMD that offers more transparency in terms of knowing the pick-up time and leading time, which increases

customer loyalty and trust in CLD over the LSPs. In addition, these features benefit people in rural areas and give them more access to markets. We can conclude that even though the address issue still exists, the problem has been dramatically reduced. See Figure 26.

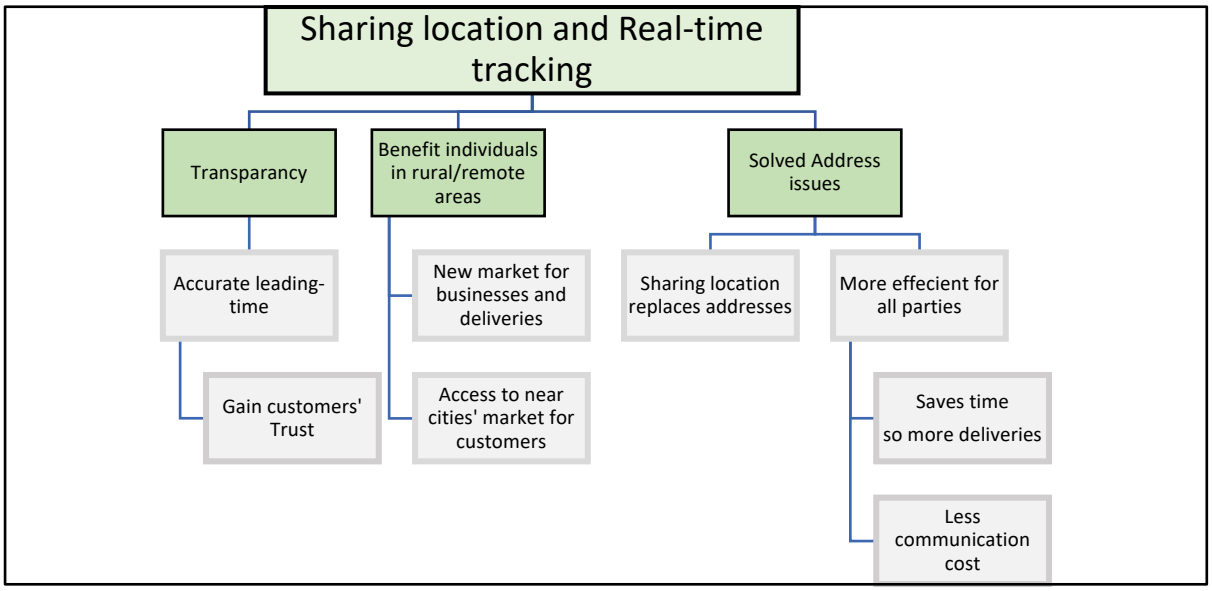


*Figure 26 The benefits of sharing location*

*5.4.4.4 Speed of delivery:*

The speed of delivery is one of the most significant Last Mile Delivery (LMD) values for CLD stakeholders. The feature of fast delivery in all business models of CLD solved many issues that customers and retailers faced. Although some of the LSPs have improved their delivery speed, currently, there is no delivery faster than that of CLD. One of the reasons is the larger number of drivers employed by CLD compared to the traditional logistics services providers. Therefore, the CLD has the advantage of having one driver for a few or each of the customer orders. For instance, the application owner of a B-to-B-Contract CLD discussed how CLD is an efficient solution for the delay issue in LMD. HD, an application owner, in referring to the speed of delivery in the LSP and CLD market, highlighted:

> *"We studied the market, and we found that the average delivery time the LSP courier takes to deliver a package from e-commerce is 2-4 days. Keep in mind, four days for a product that is ready in the warehouse, which does not make sense as if you call domino's pizza today, for example, and order a pizza, they will make it from scratch and deliver it within 40 minutes. Why should a final product in a local warehouse like an iPhone take up to*

*4 days to be delivered? What happens is that the final product arrives at the warehouse and they wait until they get more orders to the same zone before they deliver it, which is basically optimisation and reducing cost for them. Let us say they have 1000 items and 10 drivers; each driver takes 100 items to deliver to his zone, which will take days. Why not having 1000 drivers who will get all items delivered in an hour. Who can do this? Crowd Logistics."* HD Application Owner

The study revealed interviewees generally agreed on the need to adopt CLD type solutions to deal with the increased demand due to seasonality and the resulting operational issues. For this reason, some LSPs have adopted a sharing economy model by using CLD as one of their solutions, especially in high seasons. For example, RA international LSP manager highlighted:

*"We adopted the sharing economy model recently, for the locals who can drive using their own vehicles. We pay them per parcel. Different payments based on the season; in the high season, we pay more. We started less than a year ago. It was very successful, above our expectations*." RA Int. LSP Regional Manager

He continued:

*"Demand is very high, so we need this kind of solution to expand our capacity. The good thing is that CLD relies on a large number of people so if someone does not turn up, there are always replacements"* RA Int. LSP regional Manager

This particular LSP has its own way of organising this service rather than outsourcing to a CLD company as a solution.

Another LSP employed a different approach. Their manager discussed, with regard to the high demand, their CLD solution for faster delivery:

*"We believe CLD reduces the operation headache, reduces it big time. Like we have here in … (name of the company) 200 drivers in the Kingdom and we have huge growth, which needs right now 800 drivers. With those 200 we need also to hire supervisors for them and then we hire a manager, and we will need more cars, insurance, salaries, system, so we get into an operation headache circle that is not easy. So, we can avoid all of this and*

*hire third party …, …, …, and … (CLD companies) so we minimise costs. The idea we are thinking of is to build an application something like … (name of a CLD company) in a small version for us for those who want to work part-time."* WF Local LSP Manager

Thus, LSPs realise the value of faster delivery in practice and have started adopting the CLD model. The order load has increased more than at any time before e-commerce, and since CLD is faster than LSPs and traditional deliveries, the task for those who do not adopt the model in matching the delivery time will be more difficult.

Hence, CLD applications have been competing on how to deliver faster not only with LSPs, which take days, but with other CLD applications and business models in the market that can deliver in less than an hour. This competitive advantage has contributed to these being the preferred applications for customers, hence increasing the number of users. To this end, some applications even took the step of giving compensation to customers in certain cases. For instance, a B-to-C model application has a policy that customers will have the order for free and the delivery cost-free if they receive the order in more than 40 minutes, as a way of attracting customers to sign up and use the application. Some other applications give customers their orders for free if the delivery took more than an hour. Others, meanwhile, have put in place a policy for compensation eligibility, covering such as the customer who has used the application more than a certain number of times. Customers viewed the compensation policy as a guarantee that the delivery will be fast, otherwise, the delivery and the order will be free of charge. For instance, MAL explained:

*"I know most of the time my order will not be late as the applications guarantee that the order will be free of charge if there is a delay. Some applications do not have that policy, but still, I can call and have compensation if it gets too late"* MAL Customer

Since compensations are not included in all applications, applications that do include them have an advantage over those who do not. These policies attract more customers, meaning speed of delivery has emerged as a key value for application owners. QR is another customer who highlighted the compensation and refund as a feature and guarantee of timely delivery:

*"…. (Name of the application) has a policy that if the delivery took more than 40 minutes, you take it for free."* QR Customer

In terms of competition over faster delivery, another application had cut the delivery time to an average of 29 minutes.

Because of these policies, delays in delivery have become unacceptable to customers; hence, the popularity of the LSPs and the traditional LMD has decreased in stakeholders' perspectives.

The speed of delivery is a common feature among other CLD business models. However, in B-to-C and C-to-C business models the speed of delivery is more important for customers than in other models, as they deal with food, grocery, and other items that are needed instantly. As the implementation of CLD is different from one model to another, the values for customers are different, and one plays a larger role than another. For this reason, an application owner also confirmed that the speed of delivery is one of the main competitive advantages for the B-to-C model, and they had implemented a new feature to address that. Hence, the CLD application owners emphasised that the speed of delivery had become an important value.

To conclude, this subsection has shown that the speed of delivery in all CLD business models is valuable to all stakeholders. The higher number of drivers in CLD than in traditional delivery models gives them the advantage of ensuring faster delivery.

Business models and applications compete on providing the fastest delivery so as to increase their customer base. For example, they provide compensation in the case of delayed delivery, or they offer a specific service to ensure even faster delivery. Hence, the speed of delivery is one of the values that enhances the use of CLD as a last-mile solution.

#### *5.4.4.5 Drop-off Flexibility and responsiveness vs Unattended home delivery and return of items*

In this sub-section, drop-off flexibility, represented by the ease of communication, will be discussed as well as the issues it solves, such as unattended home delivery, waiting at home when expecting a package, going to the warehouse to pick up items, and repeated visits as a consequence.

The flexibility in CLD gives stakeholders a considerable advantage in terms of efficiency and effectiveness. Drop-off flexibility contributes to solving several Last Mile Delivery (LMD) issues that cause inefficiency and complaints from different stakeholders.

Customers and drivers revealed that the ease of communication, whether through the application or direct calls, saved them a lot of time, and hence the service became more efficient and more productive. For instance, a customer can call or text the driver through the application to change the destination. More importantly, a driver can make a call to notify a customer when he is on his way, which allows the customer to be ready, or if customers are not at home, they can inform the driver and redirect him to their current location. This flexibility can be provided due to the fewer number of items assigned for drivers to deliver. In other words, the drivers do not consolidate items for more deliveries, and each driver is assigned deliveries to one or a few customers. In contrast, in the case of LSPs that have not adopted drop-off flexibility, the driver covers a particular geographical area, limiting the CLD flexibility and leading to increased inefficiency, as the LSP manager mentioned. LSP drivers are unable to meet a customer's request to change the delivery location, as RA, international LSP regional manager, explained:

> *"We distribute drivers based on geographical areas. If the customer asks us to deliver it to a different address in a different area than the originally provided one, it will be assigned to a different driver who is in charge of delivering in that area, on another day, or the customer will have to pick it up from the branch."* RA Int. LSP regional manager

In cases where the home is unattended at the time of delivery, CLD drivers can easily and quickly call the customers and ask them where to put the package. This is different from the traditional way of handling the items, where the driver takes the items back to the warehouse/office. This will incur extra and unnecessary cost for the LSPs and lead to customer dissatisfaction.

Customers see drop-off flexibility as one of the central values of CLD. For instance, with CLD, the customers do not have to go to the branch to collect the items and do not have to be concerned about items being delivered to unattended homes. The following statements by customers show their perspectives on the value of the flexibility:

> *"I do not have to wait at home all day to just wait for the driver's call anymore"* RAJ Customer

> *"You can ask the driver about picking it up as you have direct contact with the driver, and he will understand to do what you tell him"* QR Customer

*"I found it better than the traditional because … (Company name) needs me to be at home or they will not deliver."* FMG Customer

*"As a consumer, I can communicate with the driver very easily."* MAL Customer

*"All the communication is through the app, with no cost."* ABS Customer

With regard to the business models, they all have the flexibility and a way of communication that allows their drivers to contact the customers. However, some of those ways lead to cultural-privacy issues which *will be discussed in the conflict section (cultural section)*.

The CLD, therefore, prevents repeated delivery attempts in the case of an unattended home, which contributes both economic and environmental values for drivers and saves customers time, as they no longer have to pick up their items from the office or any other pick-up point.

*Lesson learned:*

There is a lack of engagement of stakeholders in order to improve LMD issues in general. Thus, there is an urgent need for involving all stakeholders in collaboration: Industrial, Institutional, and Individual, to solve the address issue, as it is a major issue in the LMD context. The address issue does not only cause economic issues, it also creates social and environmental issues.

Various stakeholders play a large role in causing the address issue. Those issues are represented by the conflict in various stakeholders' interests, such as e-commerce companies not wanting to lose customers' purchases and allowing customers to enter any random address. This is a big challenge since a large volume of loads come to the LSPs and CLD from e-commerce alone. Also, LSP companies need to work with institutional stakeholders to improve the address infrastructure instead of relying on communication with individuals, which causes inefficiency and social issues, as we will discuss in *RQ3*. Individual awareness needs to be increased by fixing problems that include but are not limited to language barriers.

Having discussed the LMD-related benefits as the first theme to explain why stakeholders use CLD as an LMD solution, the next section discusses CLD's impact on society as the second theme interviewees identified as a reason for using CLD as an LMD solution.

### *5.4.5 CLD's impact on society:*

#### *5.4.5.1 Enhances the community and supports drivers:*

The interviewees highlighted that the desire to support the drivers is an important consideration, which was not the case prior to the introduction of CLD. In the past, there were no actual or official part-time jobs for individuals, including college students. Such part-time jobs were almost non-existent until early 2016. Moreover, there was a lack of receptiveness towards this type of job in social perceptions, as NW partially explains in the following quote. CLD's capacity to create jobs made a significant difference in attitudes toward earning money and resulted in a cultural shift in the perception of a person having a part-time job. Consequently, people started to take these kinds of jobs and found them useful, easy, and a decent way to earn an income. Furthermore, the increased acceptability of these jobs in the eyes of the community appeared to be a motivation for customers to participate in CLD. For instance, NW explained his usage of CLD as a Last-Mile Delivery (LMD) solution over other solutions was partly to encourage locals to take on such jobs:

> *"I appreciate the job opportunities CLD offers to my fellow citizens. Besides the time-and-location flexibility it provided, it caused a paradigm shift in how we, Saudis, see jobs. Now Saudis are more open to part-time jobs and second jobs, like never before. The afore-mentioned reasons influence my decision between CLD and traditional logistics."* NW Customer

The interviews showed that there is a drive to use CLD among both customers and drivers. Some customers use CLD just to support drivers financially and keep them going, as NW mentioned. Furthermore, surprisingly, some customers mentioned that even though they have their own vehicles, they use CLD for the specific reason of supporting these workers. The community shows support to the drivers in different ways, and this support is realised by the drivers. MHS gave an example of how customers support drivers by not taking their change, offering this not as a tip but as an encouragement to work, as MHF explained:

> *"I feel there is a support from the community. For example, I delivered to an employee at the university, and the bill was 65 SR, but he gave me 500 SR and did not take his change. I always get support like this."* MHF Driver

In contrast, LSPs do not provide such advantages as their drivers are usually employed full-time. Using LSPs therefore would not have brought about the change in mentality or acceptance of part-time drivers that has been seen in the case of CLD. Hence, CLD's contribution in creating these jobs motivated individual customers to use CLD as an LMD solution. In terms of sustainability, enhancing community is categorised as a social dimension.

5.4.5.2 *Lower LMD price*:

The lower cost is one of the main values for customers, whether they are individuals or business retailers (industry), as mentioned previously. The lower price provides benefits when using CLD as a solution over the LSPs. Although CLD offers a lower price in general, customers see it as one of the main reasons to pick one type of CLD application over another in the same model, or sometimes different models depending on the type of delivery. For instance, as previously stated by one customer, the price led them to use a certain application that is not even built to deliver goods. More specifically, some customers use passenger applications similar to *Uber* to deliver items from point to point only because it is cheaper, while the customer can use a C-to-C model to do the same task. ADL explained:

> *"If I want to deliver something to a friend in a city or pick up something, I use the regular … (similar to Uber), the one for passengers. For example, one day when I was having a picnic near the beach, I took my friend's car key to get something from his car, and I forgot to return it to him. So, I went home late at night, and I ended up taking my friend's car key with me. There was no way I was going back again to that area, which is at least 30 minutes away from*
>
> *where I live, and I was so exhausted. So, I requested … (similar to Uber), I put my friend's place as the destination, and I gave the driver the key to deliver it. I did that because it was cheaper when I compared it with … (name of C-to-C application)."* ADL Customer

In general, the prices of CLD and applications of sharing economy models are much lower than those of other applications, due to the light assets CLD has from the sharing economy model. Although customers use different delivery methods, they still prefer the CLD way of delivery because of the lower prices, which some believe are cut by as much as half:

*"The most important thing to me is that it is cheaper than any other type of delivery. Moreover, some of its applications are half the price of others"* DGN Customer

The price plays a significant role as one of the customer interests. Meeting the customer interests as stakeholders contributes to getting more drivers and customers for the CLD provider (applications). In other words, the lower price the application offers, the more popular it will get, and more customers and drivers will sign up. ABS highlighted:

*"Most of us know when an application has a promotion or offers a free or lower price. It has become a habit for us to check all the applications downloaded and compare prices and go with the lower ones."* ABS Customer

Another customer mentioned that the decision he makes on which delivery method to choose all depends on the price. KM stated:

*"Price is the major factor in deciding which provider I buy from, if any, I believe the price"* KM Customer

That indicates that the price is a major value in customers' perspectives. MAL also highlighted:

*"As students, it helps us to save more*" MAL Customer

*5.4.5.3 Accessibility:*

The innovation of using the sharing economy model and ICT for CLD makes the service more accessible, and as a result it was one of the main values customers emphasised as a reason to use CLD as an LMD solution. CLD application innovations such as LMD that gained customers' acceptance and motivated their use include ease of use, time-saving (meaning more time to spend with family/at home), and giving customers control over their orders and deliveries.

There are two reasons explaining why introducing innovation into CLD has improved the customer experience. First, innovation has created value for customers by making the ordering process easier than ever. At their fingertips, in both models, customers can have what they want to be delivered in less than 40 minutes, without even calling. Furthermore, in B-to-C and C-to-C, customers can see the whole menu/products that shops offer and select what they desire.

*"Having lots of menus at my fingertips and it has a variety of options"* HG Customer

Thus, comparing the CLD as a last-mile solution with the traditional delivery, whether that is for a retailer, restaurant or even an e-commerce company, the CLD has become the easiest way of selecting, amending, and customising what customers desire. Before the advent of CLD applications, for example, the most common way was to call the restaurant, ask about the items on the menu, give the order, and then give the area name to deliver to. However, now everything is automated, including filling in the information and selecting the items wanted, with almost no communication cost to the retailers' customer or the drivers. The same applies to other retailers, such as pharmacies and cosmetics stores.

Secondly, innovation allows customers to rate and review individual drivers online. This gives customers a voice and some influence over CLD service because the reviews result in better services and treatment from drivers. As one customer puts it:

*"I am kind of his boss"* FMG Customer

Therefore, CLD is a game-changer for customers in delivery. In the case of low-quality service or delay in delivery, the rating and review result in an immediate change. Furthermore, some customers believe that the drivers treat them better when they mention the review to the driver in one way or another. In addition to this point, the higher the review a driver receives, the better the service and communication customers will get from that driver, as SMN explained:

**"***The driver cares about his review as it impacts his future orders"* SMN Customer

On the other hand, reviews and ratings are ways the retailers and application owners use to improve the delivery quality, which will be discussed in detail in (*the quality issue in the trust section)*. Innovation never stops in the CLD industry; it is constantly developing.

*5.4.5.4 Transportation opportunity:*

Lack of transportation is considered a social issue that CLD can solve. Some of the customers revealed (UF1) that they do not have a vehicle to enable them to fetch what they want; moreover, there is no public transportation in the country. CLD allows retailers to deliver with low cost, and customers can hire someone to pick up whatever they want from any store. This has contributed to CLD becoming the main delivery option when purchasing from retailers, restaurants, coffee shops, etc.

Furthermore, CLD has become a valuable solution for all users, especially for females due to the fact that in the past females were not allowed to drive. Before the new driving law was introduced in 2018, only a tiny percentage of females knew how to drive, which means that females account for the highest number of CLD users in Saudi Arabia, according to all the stakeholder interviews. Besides, CLD's value lies in delivery from shops that do not themselves deliver, and it is available 24/7, so it is especially advantageous for females that do not drive and for those who do not have any means of transportation. One of the female interviewees highlighted:

> *"CLD has many benefits, especially for those who do not have transportation"* UF1 Customer

Another female explained:

> *"Sometimes, because it is late at night, I have to use it."* UF2 Customer

A driver highlighted:

> *"Females are the most frequent users of the service because they need it more. It is possible that one house has only females in it, and they do not know how to drive, or they do not have cars sometimes, so they need CLD more than males."* BGT Driver

Application owner LA confirmed:

> *"Most the orders are coming from females. Not every female has a driver and there are some people at home who cannot drive or move; hence, the new lifestyle our CLD application created has an impact on their social life and this will continue."* LA Application Owner

Will the change in the driving law relating to women affect the number of users in the future? As yet, this is unknown.

Additionally, males who do not own vehicles or whose cars have broken down have found CLD a problem solver for most of their daily basic needs, such as pharmacy, cosmetics, grocery, and even home toolboxes and electricity producers.

A customer mentioned the reason he started using CLD in the first place:

> *"I started using it when my car broke down."* ADL Customer

Besides, CLD provides value for those who want to avoid traffic. FMG explained:

> *"Most of the time, I use it when there is traffic congestion or in rush hours. I just use it and stay at home. So, efficiency, hassle-free, and time saving are why I use CLD."* FMG Customer

By using the C-to-C business model, customers can also access their packages/parcels from warehouse delivery companies that fail to deliver or ask customers to come and collect them.

Figure 27 shows the LMD-related benefits and CLD impact on society themes findings among stakeholders' groups.

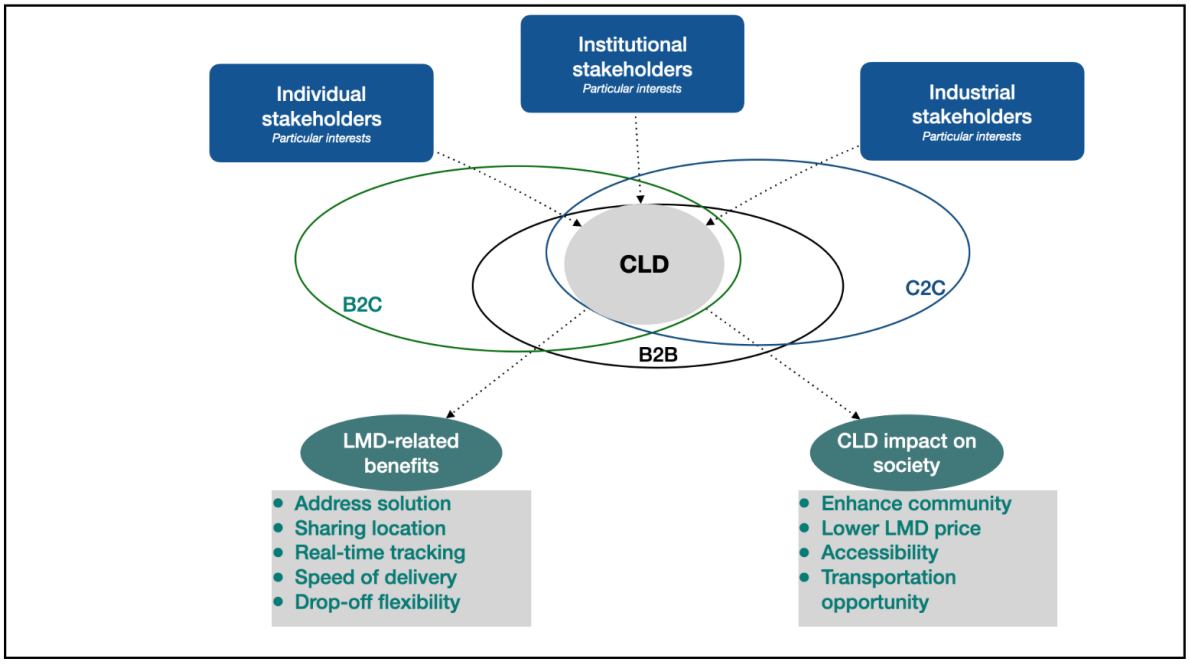


*Figure 27 Stakeholders' mutual benefits*

Having looked at RO5 to explore how the values and interests for individual (customers) stakeholders provided by CLD help to explain its use (RQ2), we now turn to discuss the values and interests of individual (drivers/crowd) stakeholders, i.e. RO6. To put it in another way, the factors that affect CLD sustainability in terms of crowd participation (external factors).

### *5.4.6 External factors that enhance drivers' participation in CLD*

#### *5.4.6.1 Non-monetary interests:*

Some drivers use CLD for non-financial reasons, for example, they work on a voluntary basis and they deliver for free. Some drivers use CLD to socialise with others, while others use it to improve their communication skills and gain more confidence. For instance, as presented earlier in relation to price bidding, MHF highlighted other values besides the source of income as an LMD solution driver:

> *"One of the things that I do not like in my personality that I am not an outgoing person and shy sometimes so I would like to overcome these issues by using these applications, which give me a chance to talk and communicate with people and improve my communication skills. However, the main thing is the extra income and then to socialise when I am bored late at night by accepting orders."* MHF Driver

In addition, the work flexibility for drivers that CLD provides; they can choose when and where they want to work. With CLD all they have to do is turn on the service mode in the application on their phones, and they are able to work. MHS explained the non-monetary motivation of using CLD, which pays him only 8SR for 200km:

> *"I am going there every weekend anyway; it is worth taking some parcels with me"* MHS Driver

In addition, the work flexibility allows drivers to pick up the packages on their way to work/school or on their way back and drop them off. BGT and MHF also highlighted the same point. Thus, it becomes another of the main motivations for drivers to use CLD. CLD gives the drivers not only a job opportunity, but also jobs that they can fit within their daily schedule, which is a significant benefit.

#### *5.4.6.2 Monetary interests:*

CLD also provides the value of earning (more) money. Drivers highlighted the importance of having an extra income as one of the significant benefits for all drivers in all business models. The most mentioned interest and beneficial value from their perspective is the extra income. Examples are provided by MHS and QH, B-to-B-Contract and B-to-C drivers, respectively, which highlight the value:

*"I saw a job opportunity, and I saw that the market needs it, plus extra income as a part-time job."* MHS Driver

QH explained:

*"I know how much I will make this day by delivering several packages. So, when I need money."* QH Driver

YSA and QH further explained:

*"CLD does not force me to work certain hours, I can work whenever I want, for whoever I want, wherever I want, in any city any time."* YSA Driver

*"It is not a formal job, so I can quit and work whenever. Every time you get an order, and once you have the time and need money, you just accept any order and deliver."* QH Driver

Figure 28 shows the overall drivers' participation factors. Particularly, the limitation of each business model the drivers' factors to participate in a certain business model (what attracts drivers to participate in one rather than another) as mentioned in section 5.4.2 and in CLD as a whole as mentioned in this section.

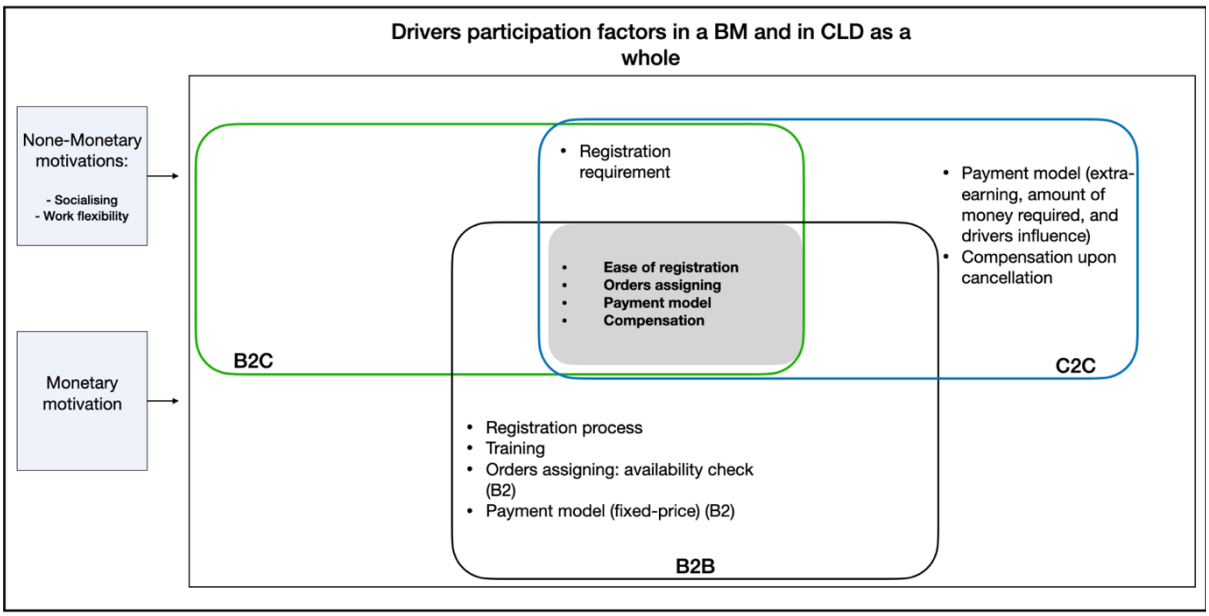


*Figure 28 Factors show what make drivers attractive to a BM and CLD as a whole*

*5.4.7 Sustainability motivations:*

This subsection depicts the three bottom line sustainability motivations from different perspectives. As such it investigates RO6. However, the individuals (customers and drivers) that were interviewed neither showed interest in nor saw the value of sustainability, and clearly were not motivated by sustainability. In terms of other stakeholder groups, there were some misunderstandings of the concept of sustainability, and this was clarified by the researcher throughout the interviews. For instance, based on the responses to the semi-structured interview question in the sustainability section, for the industrial stakeholders the economic dimension provided the main reason for establishing their business models, the social dimension came next, commensurate to the economic goals. Environmental sustainability was not mentioned as a motivation or in the planning.

The industrial and institutional perspectives on these dimensions are discussed below.

*5.4.8 Perspectives on sustainability:*

Although this section will highlight the social dimension as values that CLD provides, the industrial interests in CLD clearly derive mainly from the economic point of view. The lower cost and the market opportunity are the main drivers for using CLD.

*5.4.8.1 Economic perspectives:*

*Lower cost:*

For application owners, the B-to-C model allows delivery companies to reduce their labour cost, again thanks to the light infrastructure the sharing economy provides. Therefore, by adopting CLD, the application owners have lower costs compared to a traditional delivery company. In this regard, BS, a B-to-C application owner, highlighted:

> *"We used to treat our drivers as employees, we used to pay their health insurance, salaries, for their accommodation, but we changed the model to CLD which cut most of our labour cost. Now we have more than 250k drivers around the country."* BS Application Owner

Having vehicles for deliveries increases the cost, as the owner pays for the assets. In terms of delivery, having few vehicles for a high number of orders may delay delivery and consequently decrease customers' satisfaction and lower sales. Retailers revealed that they gained two main values by adopting the CLD feature of cost reduction: an increase in sales and expansion of the business. A restaurant owner explained:

> *"We increased our sales by almost 200%. Now we mainly rely on the CLD applications sales. Having a traditional delivery will include expensive assets or managing the delivery operation. For example, medical insurance, accommodation for employees, and so on."* TF Restaurant Owner

TF also highlighted:

> *"Expansion is expensive; having more branches or any type of expansion needs more investment. Therefore, we expanded by reducing the operation costs as well as increasing our sales through deliveries."* TF Restaurant Owner

On the other hand, the LSPs that used CLD would benefit from the lower costs, as WF mentioned previously in the speed of delivery section:

> *"With those 200 we need also to hire supervisors for them and then we hire a manager, and we will need more cars, insurance, salaries, system, so we get into an operation headache circle that is not easy"* WF Local LSP Manager

Thus, there is a clear economic benefit of CLD as an LMD solution for the industrial stakeholders.

*5.4.8.2* <u>*Social perspectives:*</u>

<u>*How CLD contributes to society through, hiring, social development, and training:*</u>

Having a new source of income for stakeholders, such as drivers, retailers, and application owners in all business models, makes CLD the most used and most favourable LMD solution. In the B-to-C business model, for example, demand in the food industry has increased dramatically, which motivates the applications owners to use CLD as an LMD solution to link drivers, customers and restaurants owners. BS highlighted:

> *"Now, we rely on CLD and the companies that stick to the traditional way either have gone out of business or have a very low market share. Simply because they receive a lot of orders and they end up giving one driver too many orders to deliver, and customers cannot wait. After CLD, now we have more than 150k orders a day in the kingdom."* BS Application Owner

As the interest of industrial stakeholders is purely economic, the CLD contributes to increasing the overall skills of people by hiring and providing training programmes in different disciplines, such as IT, marketing, communication skills, and quality management. HD, in the implementation section 5.3, mentioned the training they provide for drivers when they sign up. BS also highlighted the need for workers which indicates how CLD adds value to society:

> *"We have vacancies for programme developers, marketing, and all IT types of jobs. We train and hire as well."* BS Application Owner

A C-to-C application owner also highlighted:

> *"We provide value to the society by training and hiring. I believe the biggest impact in improving society comes from the start-ups more than what the big businesses do. These start-ups create more jobs and more opportunities to the society that were not there before. While the big businesses may impact on 10k employees and their families, companies like ours impact on more than 300k employees. OK, let us say not all of those who are registered are working, let us say 80k-120k of them are working and helping their families. So, there is a huge social impact we provide.* LA Application Owner

Although LA emphasised the value of training the CLD provides from the perspective of his company, he also emphasised the contribution his company makes in terms of income. As HD previously mentioned in section 5.3.1, the drivers attend two-hour training programmes. Thus, the value the CLD provides to the society contributes to its sustainability.

In practice, although the social dimension is not a motive, the CLD provides social benefits to the community through the industrial stakeholders. However, the industrial stakeholders' lack of interest in the social dimension will negatively impact CLD's sustainability and that of LMD industry in general.

*5.4.8.3 Environmental perspectives:*

*Lack of environmental motivation among all stakeholders:*

The study showed that none of the stakeholders interviewed mentioned any environmental values, and so this did not play a role in motivating use of CLD as an LMD solution. In other words, the use of CLD by stakeholders is driven by the potential economic and social benefits

and not by environmental drivers such as the decrease pollution, traffic and resource usage, and use of land.

While interviewees, particularly industrial and institutional stakeholders, are aware of these benefits and show appreciation for them, they are not motivations to adopt CLD. Consequently, both industrial and institutional stakeholders lack the motivation to innovate and apply more environmentally friendly solutions, such as choice of mode, which is one of the factors for sustainability.

The application owner emphasised the importance of the environmental benefits from using the sharing economy; however, these benefits did not motivate him. HD pointed out that environmental motivation should be driven mainly by policy makers through regulations so as to encourage the benefits that can come from CLD. HD explained his perspective by highlighting:

> *"We still consume plastic. Therefore, the context is not ready yet to think about the environment. However, the thing that I really appreciate in the sharing economy is its utilisation of assets. How many cars do we have in X? We all suffer from traffic jams. So, let us say you work in the north and you live in the south, why don't you take 5-6 packages on your way, you make money and there is no need to send 5 trucks daily? So, traffic and emissions all benefit from the sharing economy. Is it a need? Yes. Is it a motivation? It is definitely not."* HD Application Owner

While the environmental benefit is one of the main purposes of implementing CLD in some western economies, as is mentioned in the literature, it is not a driver for the implementation of CLD, at least not in the Saudi Arabian context of this study. Culture affects the way society thinks and there appears to be less impetus to make environmental changes in emerging economies as compared to the western context. Therefore, the environmental solutions are fewer than in the west. Due to the lack of environmental motivation among all the stakeholders, there are no environmental solutions/choices available, such as cycles or environmentally friendly vehicles. Even if they were adopted, the study shows they would not meet the customers' and drivers' preferences. Hence, this finding shows the implementations differ when compared to the western countries from whence the idea of CLD originally came. SR explained:

> *"The main motivation right now is reducing unemployment by focussing on legislation of CLD at the moment and facilitating the requirements for drivers, the owners of the vehicles. The environmental motivations come later when we have developed the system, but for now we focus on legislations that are more important than the environmental side."* SR High Level Decision Maker in The Public Transport Authority

*Land usage and noise:*

The institutional stakeholders' aim would be to look after their citizens while establishing an economic environment that attracts business. Thereby, they would meet all stakeholders' interests. Although the regulators showed that the main concern is the social impact and citizens' living standards, most of the answers were related to the barriers that impact on sustainability themes in terms of legislation. However, the answers from the institutional stakeholders on the social values and impact express agreement with and support for CLD. The role of the institutional stakeholders is apparently to facilitate rather than restrict the business of CLD providers.

Thus, there is major neglect of the environmental dimension on the part of all stakeholders. Figure 29 shows the summary of industrial and institutional groups' perspectives on sustainability.

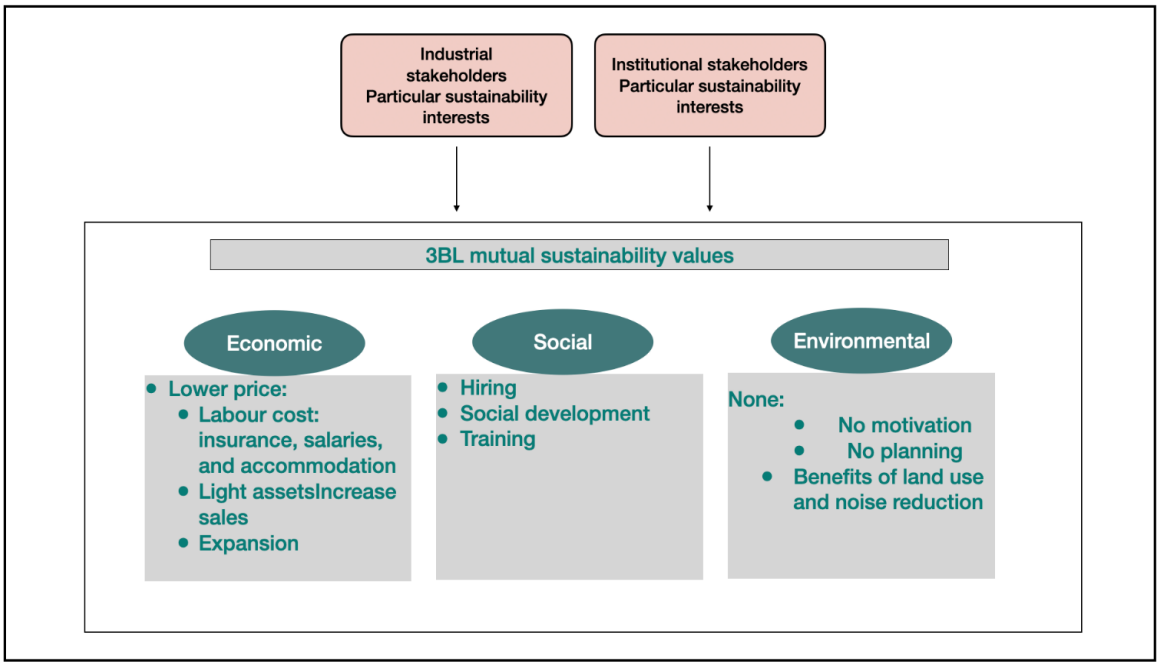


*Figure 29 Stakeholders' perspectives on sustainability*

## *5.5 CLD challenges faced by stakeholders:*

This section presents the findings with regard to RQ3. It shows the conflict between different stakeholder interests that act as a challenge for CLD as an LMD solution. It investigates the following RQ and its objectives:

### *5.5.1 RQ3 recall:*

*RQ3) What are the challenges the identified stakeholders face in CLD?*

RO7: To explore the current and potential challenges different stakeholders' groups face that prevent the development of CLD as an LMD solution

### *5.5.2 Conflicts of Industrial vs institutional stakeholders:*

#### *5.5.2.1 Legislation:*

##### *5.5.2.1.1 Requirements can cause unequal competition:*

The difficulty of meeting the legal requirements can affect CLD development in terms of competing with LSPs within the city. The requirements of having a big brand and ten years of operational experience to be an LMD player are not easy to meet as CLD start-ups. First, it is not yet clear whether there is a requirement for a licence for the CLD from the institutional perspective, as is the case with LMD businesses (traditional ones). Thus, industrial stakeholders found regulations vague and they will be very difficult to meet if they are the same as for LSPs. HD highlighted:

> *"Barriers mainly relate to the legislation. There is no licence, as CLD is something new."* HD Application Owner

Then, HD explained the licence issue they are facing:

> *"The problem with the LMD licence and regulations, first you cannot have a local brand, you have to bring an international brand from outside the country and have it operate in the country. Also, this company has to have operated for at least ten years internationally. So, the requirements are very difficult to meet."* HD Application Owner

On one hand, this has also created an issue for LSPs due to unequal competition with CLD, especially when the LSPs consider CLD businesses as competitors. For instance, the big LSPs companies have to have a licence to do their job, including LMD. However, the CLD businesses, which are considered as competitors, do not require a licence at the moment. The conflict between the industrial and institutional perspectives created issues for both of these stakeholders' groups, and to a lesser extent the individual stakeholders. That affects the last mile business in general and makes it an unfair game. As a consequence, complaints emerged from the LSPs on the grounds. That encouraged the legislator to act faster than before as the high-level decision maker mentioned:

> *"The legislation authority will start making licences in the near future after we have studied the case for a while. The licences will be for all but with written conditions and policies. That will open the door for the CLD applications and others to work in an official and appropriate way. More importantly, the competition will be fair in this case (when they start giving licences) because the conditions and policies will be applied to them all. Hence, they will need to pay the same costs that others pay and that will raise the price for the customer as well. There are around 300 applications on the waiting list for the licence*." ZF High Level Decision Maker in regulations and laws

The competition may be unequal if there are some applications that do not adhere to the rules. The competition between the CLD applications is imbalanced from the application owner's perspective because some CLD applications will follow the new policies while others may ignore them. That gives an advantage to those applications that do not adhere with policies; for example, one of the advantages is the reduction in labour costs. For instance, the new policy for CLD applications is called 'Saudization'. Saudization is a part of the implementation of the Saudi Vision 2030, launched in 2016. A key element of the programme and one of its aims is to reduce the number of unemployed Saudi citizens. Saudization started to be implemented in different sectors in 2016, and now the government is about to enforce implementation of the Saudization policy in the CLD sector by hiring Saudi drivers only. However, it is cheaper for customers and contractors, and hence it will mean less payment for drivers and lower cost for deliveries. Thus, if some applications do not implement the policy, the competition will not be fair, since they may acquire more market share than those who implemented the new policy. HD explained:

*"The ridesharing by drivers in Saudi Arabia was open to everyone, now it is only for Saudis, so you have a lot of non-Saudi drivers who used to work in ridesharing for extra income, and after that law, they have now moved to CLD. Now, as far as I know, the … Ministry that has become the legislator is working on making the same law for CLD. What the probabilities are that it is going to happen, we still do not know."* HD Application Owner

This point is also highlighted by a C-to-C application owner:

*"The regulations are the largest threat to CLD. For example, the Saudization is hard to implement as the demand is more than the supply. So, we need as many drivers as possible."* LA Application Owner

He continued:

*"The number of Saudis who want to work as drivers is limited. How many Saudi drivers can we get in the Kingdom? Let us say 100k drivers? All the delivery applications compete in the same pool to have those drivers. While you have one application that has more than 200k orders a day, another application above 150k a day. So, all of them are competing to have those 100k drivers. It is impossible."* LA Application Owner

*5.5.2.1.2 CLD's fast growth:*

The institutional perspectives highlighted that the main issue with the introduction of legislation is the fast growth of CLD. CLD's rapid growth resulted in it keeping steps ahead of the legislator and the policy making process. In other words, the decision-making process takes time, as it has to go through several ministries before it gets approved, such as Ministry of Transport, Ministry of Interior, Ministry of Labour and Social Development, and so on. As SR illustrated:

*"CLD is a growing trend in the whole world nowadays, and there is no one country that has preceded us in the work of legislation. It is a new thing that grows so fast and we try to keep up with the speed of its development. As matter of fact, the legislation is being updated as we speak."* SR High Level Decision Maker in the Public Transport Authority

Another decision maker explained:

> *"The process is not as simple as you think. It has to go through the Ministry of Labour to regulate the employment process, the Ministry of Interior to regulate the safety and privacy rules, the Ministry of Transport, Food, Drug Administration, and Ministry of Communications and Information Technology. All that requires time and a lot of time. So, we are trying to find a way to expedite all of that*." ZF High Level Decision Maker in regulations and laws

Thus, the legislation needs to keep up with the rapid pace of market growth.

*5.5.2.1.3 Illegal competitors:*

Illegal competitors are another threat to CLD's success and development. The issue of having illegal players (*whether illegal drivers who operate a business or illegal CLD application owners*) mainly affects the industrial and institutional stakeholders. There are individuals who started making their names in the market for delivery service without registering a company, such people have an economic, social, and environmental impact. The illegal drivers and illegal CLD application owners came into existence because of the ease of use of the technology; they can afford the low delivery cost as their infrastructure cost is low, and most of them are staying in the country illegally. However, there is a demand for them, firstly, from the family businesses who sell offline/online and use them to deliver their products to customers for a lower price. In addition, there is demand from regular customers, who do not care who delivers it as long as it cheap. As they post their numbers everywhere for delivery jobs and create chatting groups with customers for deliveries, they acquire a good market share, as the customers pay less. Furthermore, some of them create CLD applications at low cost and hire illegal individuals for deliveries as well. Those issues influence the CLD application owners who conduct their business legally. As ZF stated regarding this illegal competitor issue:

> *"What some CLD applications do is not legal, and we have a hard time dealing with them"* ZF High Level Decision Maker in regulations and laws

An LSP stakeholder commented on the illegal competitor issue:

> *"We meet the requirements and pay all the expenses needed, but there are still illegal players in the market, whether they be CLD or illegal individual freelancers."* DMJ local LSP VP

DMJ also highlighted:

> *"We give names and phone numbers for the illegal individual drivers to the authority almost daily."* DMJ local LSP VP

A CLD application owner stated:

> *"So, the big courier company complains about those companies who deliver without having a licence and they have to pay SR 5 million for a licence. That will be unfair for them."* HD Application Owner

However, improvements are expected soon in the legislation, to catch up with the rapid development of CLD. Thus, the legislation issues discussed above could be a result of a lack of involvement of the two stakeholders in fixing these issues.

### *5.5.3 Conflict of industrial vs individual stakeholders:*

#### *5.5.3.1 Availability of Supply-drivers*

The high demand from e-commerce and retailers has a large influence on the delivery industry in general and CLD in particular. The demand is too high and the supply is low. The supply in this case relates to the drivers. One part of this issue is that the drivers' interests are unmet by business models or industrial stakeholders. Another part is the requirement to have long-term investment in order to market the application name and recruit enough drivers, which needs more marketing budget, more capital. Furthermore, the boom in CLD applications creates more opportunities for drivers to sign up to more applications. In other words, while the number of applications increases, the problem is that some of these applications will have too few drivers. That slows the efficiency, slows down the delivery, and consequently loses customers. HD, application owner, explained:

> *"One of the barriers is the supply. Now there are a lot of CLD applications in the market, and that makes it highly competitive. Moreover, because of the model, the crowd-sourcing model, the drivers cannot commit solely to you as an application for certain working hours. So, the difficulty of having available drivers is an issue. The demand is high but the supply is not always guaranteed. It is a huge challenge – the availability of the supply"* HD Application Owner

LA explained the issue in relation to drivers:

> *"The number of drivers in the market is limited. The number of orders for e-commerce is increasing intensely day by day. We used to be surprised when a company had 10k orders a day, now we are talking about 200k orders for one application. The number of drivers in the country cannot cover all of these orders."* LA Application Owner

Then LA mentioned how CLD service providers try to fix this issue:

> *"We target the drivers who have a clean record, have a licence, and new cars and other conditions. At the end the drivers' pool will be smaller. Let us say you have a million drivers in the country, they are distributed among all CLD applications in the market. So, there is a challenge in supply."* LA Application Owner
>
> *"Ride models like Uber for passengers are taking high numbers of drivers. Those models have more than a million orders a day."* LA Application Owner
>
> *"That is why applications compete to have those drivers and create some incentives for drivers. For example, if you do three orders in the morning, you will get x amount of money besides the delivery payment. Also, sometimes coupons for a car oil change. So, there is tight competition for drivers.*" LA Application Owner

A B-to-C application owner also highlighted:

> *"We encourage everyone to sign up with us and we have some initiatives, such as an amount guaranteed for the first month after they sign up with us."* BS Application Owner

This evidence demonstrates that the demand is increasing, and the market is not saturated yet, even with the existence of LSPs.

The number of drivers can affect the speed of delivery. Customers therefore blame the application owner for the delay and the main factor is the availability of drivers.

> *"Some areas do not have a large enough number of drivers. That may affect the price for customers, as the availability of drivers is limited"* RAJ Customer

ABS and ANG highlighted:

> *"Delay is one of the main issues we face sometimes"* ABS Customer

To conclude, in most areas, due to the increase of e-commerce/online orders and technology, demand is much higher than the supply in the case of CLD. However, it is not the case in other areas where the supply exceeds the demand. Both cases create several problems. For instance, when the demand is more than the supply, it is hard to keep up with demand, and the creation of more initiatives is needed to attract drivers, as some of the application owners mentioned. That requires more investment by shareholders. In addition, it causes delay in delivering the packages, which leads to some customers switching applications. Hence, when demand exceeds supply, drivers tend to increase their delivery prices, especially in a bidding charging system. That can be a main disadvantage for all business models and for the bidding system specifically and may lead to application failure. Conversely, when the supply – number of applications – exceeds demand, which is not the case currently, that will create a problem in terms of making it more costly to acquire customers rather than drivers.

### *5.5.4 Conflict among stakeholders:*

#### *5.5.4.1 Trust*

Trust is seen differently among different stakeholders. The lack of trust of the drivers among the application owners and the LSPs is caused by several factors that include using other applications while delivering to the customers, losing/stealing products/items, and problems over the quality of the delivery. All three of these influence the customers' satisfaction.

HD mentioned how the issue of trust arises when drivers work on more than one application:

> *"The driver has more than one application he works for. That has a negative impact on the consumer."* HD Application Owner

This creates inefficiency in delivering as the drivers pick other items by using different CLD applications, whether in the same model B-to-B-Contract or other CLD models.

The main concern of the LSPs regarding trust relates to the quality of the delivery damaging the brand image. A barrier to trust is created in CLD when the drivers do not provide the delivery quality required. That is the main barrier preventing LSPs from using CLD; thus, it is a barrier for CLD. See Figure 30 and Figure 31.

> *"CLD has low quality services. Its strength is inside the city, and in the case of damage to the item is difficult to get compensation or deal with CLD."* DMJ local LSP VP

Trust is one of the factors that impacts the issue of development of CLD which affects all stakeholders. However, it is important to highlight how the stakeholders understand and identify trust, then we can see how it is applied to the CLD models.

Stakeholders view trust as varying from one model to another. Additionally, trust is seen differently among different stakeholders. Customers identify trust in three ways: compliance with delivery time (this is linked with other values CLD provides, such as speed of delivery and transparency), quality of items delivered, and drivers' honesty. Nearly all customers we interviewed mentioned a trust barrier regarding Logistics Service Providers (LSPs) because of the issue of compliance with delivery time and date. While the drivers see trust as customers being fair in giving them the right review and rating after delivery. On the other hand, industrial stakeholders, whether LSPs employees or CLD application owners, see trust in drivers as a barrier. In other words, the drivers are the only stakeholders that were mentioned by interviewees as causing a lack of trust.

Customers first paired trust in delivery with compliance with delivery time. In other words, transparency in delivery in things like leading time, as previously mentioned, is one of the values that enhances the CLD development and sustainability from stakeholders' perspectives. Although the following quotations from customers are positive about CLD, they show how stakeholders identify trust in relation to CLD. In that sense, we will be able to understand how trust impacts on CLD and its development and sustainability. The following HG and FMG quotations provide examples of how customers identify trust as compliance with delivery time:

HG customer mentioned:

> *"CLD solved the issue that I had with e-commerce's delivery for a long time. I lost trust in the traditional ones as some of my products were taking way more time than expected, they took weeks. CLD with tracking service is the best solution"* HG Customer

He continued:

> *"Delivery services here are never on time on delivery and you cannot trust the arrival time given. With CLD, I am contacted and also track my item to know exactly when it will be arriving."* HG Customer

FMG also highlighted:

*"To be honest, I always worry so much whether it is going to be delivered to me in a good condition, and it is thankfully. CLD gives the driver the chance to have just a few items to deliver and have their own small cars, unlike the LSPs. That makes me comfortable, knowing they will deliver my items. This is why I am not using the …. (well-known LSPs) anymore, they're not trustworthy, they lost and damaged items."* FMG Customer

FMG also mentioned that delay in delivery affects the provider quality and makes him lose trust:

*"Never trust LSP like … (Well-known local provider). They kept my items in their location for two weeks before they delivered them in an unacceptable condition, while they were supposed to deliver them in less than a week. They do not care about their quality and their customer service is very bad."* FHG Customer

HG, FMG, and other customers highlighted issues of adherence to the delivery time and others addressed issues of LSPs/traditional delivery companies, which made them use CLD because it provides the tracking, transparency, and speed of delivery values (mentioned in the previous section). However, other trust issues have to be taken into consideration as they affect the CLD and its development, which are the quality of items delivered and drivers' honesty. Customers believe that drivers from the crowd, who are random people and sometimes described as *strangers*, are the main stakeholders to blame in relation to these two factors, as ABD explained:

*"There is the probability that something might happen, as it is still random people who deliver that I might never have met before. However, it is still a low probability I believe. I would not trust them with confidential items or personal ones"* ABS Customer

ABS gave an example of the issues regarding trust in drivers:

*"For example, in the company that I work in, we wanted to send confidential papers to someone in another city, Jeddah, so we went to … (LSP company); it was very costly, and we ended up sending it with CLD for a third of the price. However, to be honest, we were worried so much*

*whether it was going to be delivered and if it would be in good condition and it was thankfully"* ABS Customer

KM and HG also explained:

*"Another challenge is maintaining the quality of food while driving during the rush hours"* KM Customer

*"Just needed a bit of faith as it's a new experience where you entrust a complete stranger with something of high value like a passport or official documents. I don't think the application or company have much control and it is completely dependent on the actual driver's compliance and adherence to the company's policies."* HG Customer

Hence, customers linked trust to damaging and losing the items and also complying with the delivery time. Damage of the items and delays in delivery are the two main factors that are of concern to CLD customers. Thus, we can see that the customer links quality with trust and timely delivery, so trust is also related to delay in delivering the items. An example of good quality can be illustrated by the good use of car capacity. In case of unexpected poor packaging, a driver with small car and capacity, as well as only a few items in the car, will be able to take care of the items easier compared to drivers with bigger cars, such as vans in the LSPs' case. ED explained:

*"You cannot compare the quality of a small space and a few items in delivery with a big van with a hundred items. No damage and on time delivery are what has made me trust them after a few deliveries."* ED Customer

Therefore, the quality of service is a part of the trust issue that affects the practice of CLD. Trust in CLD derives from meeting with customers' satisfaction and solving the issues that they struggled with while dealing with the LSPs.

The drivers (individual stakeholder), on the other hand, see trust in a different way. Drivers see trust as customers being honest in their review and rating of their delivery and the quality of the service, because this has a huge impact on their future orders, whether from the application owners or the customers, and consequently their income. ZIY mentioned:

> *"What I like about the CLD is the honesty in it. I always get a good rating from them based on my performance"* ZIY Driver.

ATS, another driver, explained:

> *"In every delivery I try to communicate with the customers in a good way and be understanding when they are in a different location than they gave me initially. Some days I am not in a good mood, but I trust customers to give me a fair review, which I try to maintain at five stars."* ATS Driver

Therefore, drivers trust customers to give them a fair review and rating. Another driver, IND, stated:

> *"I changed my username in … (CLD application) because some customers did not give me what I deserved in their rating. As a driver you never know, you do your best and trust the customer by being honest and they may give you good rating, but some customers give you a low rating for no reason."* IND Driver

CLD applications use the rating system to ensure that customers have a good quality of delivery.

On the other hand, industrial stakeholders (Application Owners mainly and LSP employees) see trust as affected by damage to both items and brand name and loss/theft of items as well. In the case of damage or loss of items caused by CLD drivers, application owners adhere to paying for any damage according to their contracts with the e-commerce companies, and it is the CLD application's responsibility, as was previously mentioned by HD in the B-to-B-Contract section.

However, the drivers are ultimately responsible for paying for any damage or loss of items as application owners have an agreement and contract with the drivers for all such events that might happen during the delivery. Some applications make the driver pay in advance, as mentioned earlier by the application owner HD, who took these steps in advance in the hiring process phase by applying the rule of having the driver pay a deposit of SR2500 before they can start working. Another application let the driver sign a contract that contained a condition that the driver would pay up to SR 100,000 in case a package is not delivered or is lost or damaged.

However, the application owner confirmed that the trust issue is now being solved by CLD, although it was an issue in the early stages of CLD. As HD described:

> *"At the beginning there was kind of no acceptance for CLD. People were not accepting random people delivering their items, but now they trust it more and it is very normal, and they have accepted it."* HD Application Owner

Decision makers see trust as an issue of security in terms of delivery of illegal items by individual stakeholders (both drivers and customers). Although it is partly a legislation issue, trust will remain an issue in the current implementation. IJ explained:

> *"We also found CLD applications where drivers deliver illegal items in their cars and some of them do not know what is in that parcel or package. Someone requests items to be delivered from point A to B, the driver picks them up without knowing what is inside those items. The person who requests the service will be in a random location when he handles the package and leaves after that. The driver will be under investigation for a long time until we make sure he has nothing to do with that. Legally, the driver is responsible for what he carries in his car."* IJ High Level Decision Maker in strategies and planning

Only one driver among all the interviewees was aware of this issue. BGT mentioned:

> *"Sometimes I receive orders to send to … (well- known LSP), but I do not accept them because I do not trust the person sending or receiving, as I hear stories that…"* BGT Driver

BGT does not accept orders for sending boxed items to the LSP offices/warehouse from individual customers, for security reasons, which is part of the trust issue, while other drivers have no issue with accepting such items.

Another impact of trust relates to the issue of payment in CLD as a whole. Trust concerns regarding financial transactions could be a barrier to the efficiency of the service. In this context, cash payment/Cash On Delivery (COD) is the preferred payment method among customers, as most of the customers are reluctant to use online payments due to a lack of trust or knowledge. As a result, CLD applications often provide both cash payment and online payment options. For drivers, on the other hand, cash payment can be time consuming, as it

requires having adequate monetary change, and sometimes with large bills the driver has to look for change. Again, this will increase the cost for gas, delay subsequent deliveries, and may lead to losses of current delivery orders. For e-commerce companies using a B-to-B-Contract business model, cash on delivery increases the number of returned items and reverse logistics, and consequently operational, labour and inventory costs.

> *"It is not a preferred method for us. Customers can change their mind and claim that they have bought it from a different place. However, it is a feature we provide to the customers. It is costly for sure and a headache. The percentage three years ago of our customers who paid on cash upon delivery was 80%, now it has decreased to 62%."*
>
> RA Int. LSP Regional Manager

We can conclude that trust is viewed differently by all stakeholders. Trust in CLD involves adherence with delivery time given, damage and loss, honesty, and security. In general, all stakeholders are affected by trust in regard to payment. Although trust is an issue in CLD as the LMD task is implemented by the crowd, CLD has largely solved the operational parts of it, such as the leading time and transparency, as shown in the LMD-related benefits section. Figure 30 and 31 shows how trust is seen among different stakeholders.

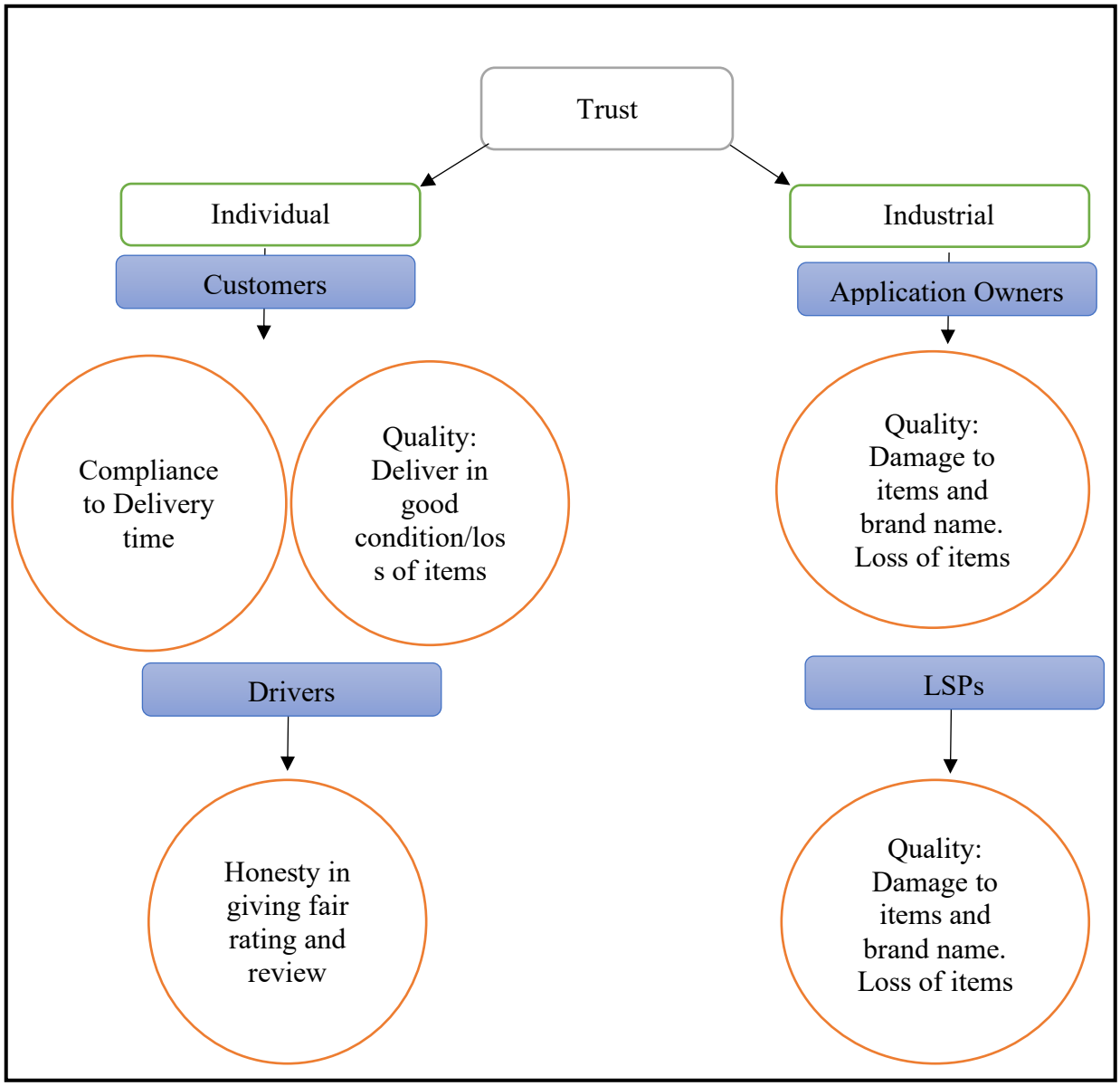


*Figure 30 How trust is seen*

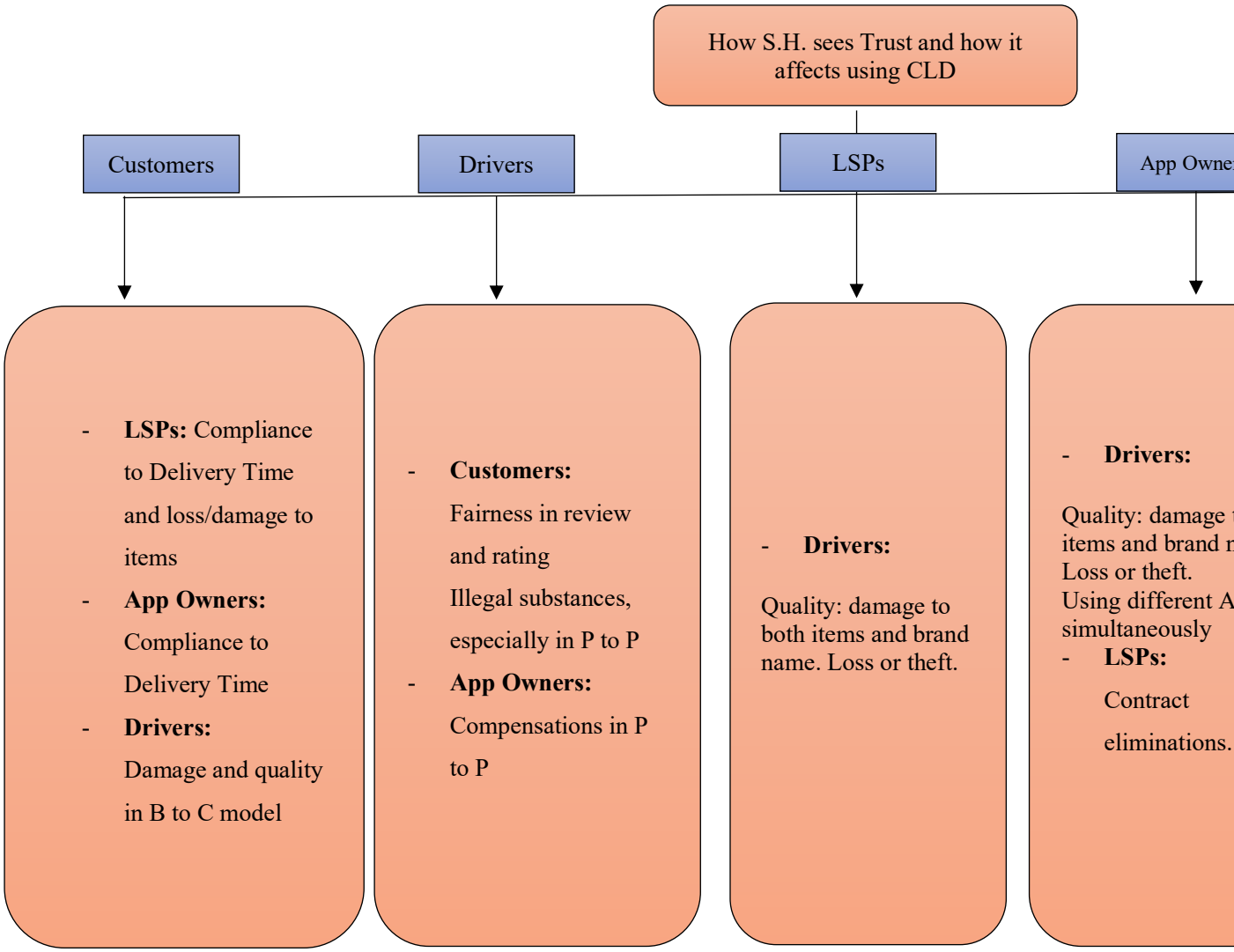


*Figure 31 How trust is seen by all stakeholders*

#### *5.5.4.2 Culture*

Stakeholders' perspectives have shown that cultural aspects have a large impact on the success or failure of CLD applications. Therefore, adopting one CLD application over another depends mainly on the way this application adheres to the culture of the target audience. The study revealed three main factors that explain how culture impacts on CLD as an LMD solution: *cultural readiness among application owners*; *drivers' and customers' perspectives on privacy*; *and stakeholders' views on trust*

##### *5.5.4.2.1 How does cultural readiness among application owners improve CLD?*

Application owners paid attention to this point by creating more features to comply with the culture. Hence, the application owners who adhere to the culture will implement prayer times in their application, for example, and, as a result, no orders will be taken/received during that time to avoid cancellations or more waiting time and dissatisfaction from different stakeholders, such as restaurant/retail owners, drivers, and customers. Consequently, a CLD local brand that knows the culture and is competing with international brands has a competitive advantage and gains higher values from its stakeholders. The application owner of one B-to-C application highlighted:

> *"We know the market more than the international companies. We put the prayer times in the applications; with other brands their orders get cancelled or are delivered late as it takes way longer leading time."*
> BS Application Owner

##### *5.5.4.2.2 How does culture explain drivers' and customers' perspectives on privacy?*

A- Communication

A major role culture plays in CLD is in the communication while delivering the packages. Drivers and customers may face a cultural challenge by having to call directly and interact with the opposite gender. As a result, some application owners have implemented a call centre service just to facilitate the delivery and logistics between the drivers and customers. Another solution is the use of window chatting as the only way of communicating with a customer. This is done through the application without showing any personal information.

Although application owners take these extra steps to overcome these issues, it makes the delivery inefficient, as the application owner mentioned. From the female interviewees' perspective, again a cultural issue, unlike with the courier (logistics service providers), where the customer's information is in a few employees' hands, in CLD, any driver from the crowd who delivers the package will have the customer's information.

Another problem related to communication is the issue of the potential misuse of personal data. For instance, after delivering a package, drivers may call customers from a different number that is not registered in the CLD application, as one customer highlighted.

The extra steps that have been taken by the industry to improve the privacy features found acceptance on the customers' side and have resulted in an increase in the number of application users; hence, they have found acceptance among the application owners, which is the main quantifier of success. However, from the drivers' perspective this extra step slows down the delivery process, which affects their income and lowers the number of orders they receive in a day.

B- Handling

Culture influences some of the ways in which a package is delivered to the opposite gender. Some female customers prefer not to interact with male drivers based on cultural and religious grounds. If the driver arrives and the female customer is the only one in the house, the driver has a few options. The first option is to put it in front of the door and leave. This option will increase the risk of the package being lost, stolen, or even the customer claiming she did not receive it. Consequently, the driver may receive a bad review, which then affects his working reputation, and he might have to pay for the package as well. The second option is to wait or come back later until a male is able to receive the package for the female customer. This option is inefficient as it will cause fuel and time wastage, and missing out on income from other orders. Even if the female customer does not have any objection to receiving the package directly from the male driver, there is a similar situation from the male drivers' view, that is, they have cultural barriers regarding interaction with female customers. This also causes inefficiency in the delivery process, as is explained by other drivers.

Our study also revealed that this also has an impact on the behaviour of consumers. For some customers, their attitude has been changed by using CLD. For example, male drivers who would not previously interact with females have now become more flexible when communicating with them. In addition, this has increased the communication skills of some of

the drivers who prefer contacting their customers directly rather than using CLD applications. This result is similar to the behaviour of the female customers.

## *5.6 Findings table and figures:*

Table 21 shows the common interests and conflicts that affect stakeholders. Figure 32 provides a summary of the research question findings. Next, Figure 33 shows how stakeholder theory was used as lens to show the findings on met and unmet interests. Finally, Figure 34 shows the final findings including the internal factors within the business models and external CLD as a whole. The arrows in green represent the common motivations among stakeholders to use CLD as a whole, the blue arrows show the drivers' mutual motivations to participate in CLD regardless of the business models they use, and the black arrows represent the limitations of CLD in terms of mutual conflicts among stakeholders.

*Table 21 Stakeholders' common interests and conflicts*

| Stakeholders' common CLD interests and conflicts | Industrial | | Individual | | Institutional |
|---|---|---|---|---|---|
| | Application owner | LSPs/e-commerce | Drivers | Customers | Decision makers |
| Legislation | √ | √ | | | √ |
| Availability of supply | √ | | √ | √ | |
| Trust | √ | √ | √ | √ | √ |
| Culture | √ | √ | √ | √ | √ |

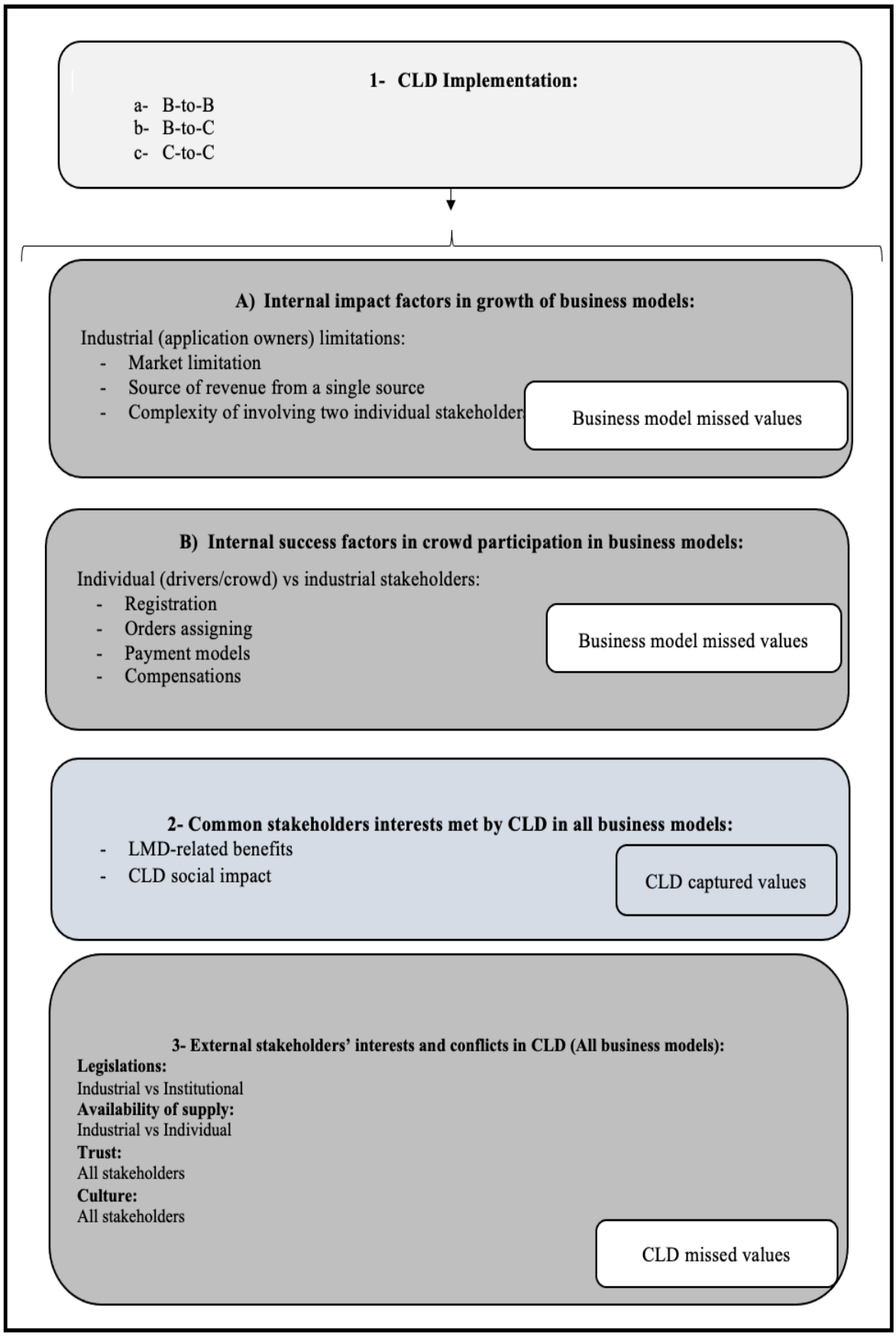


*Figure 32 RQs summary*

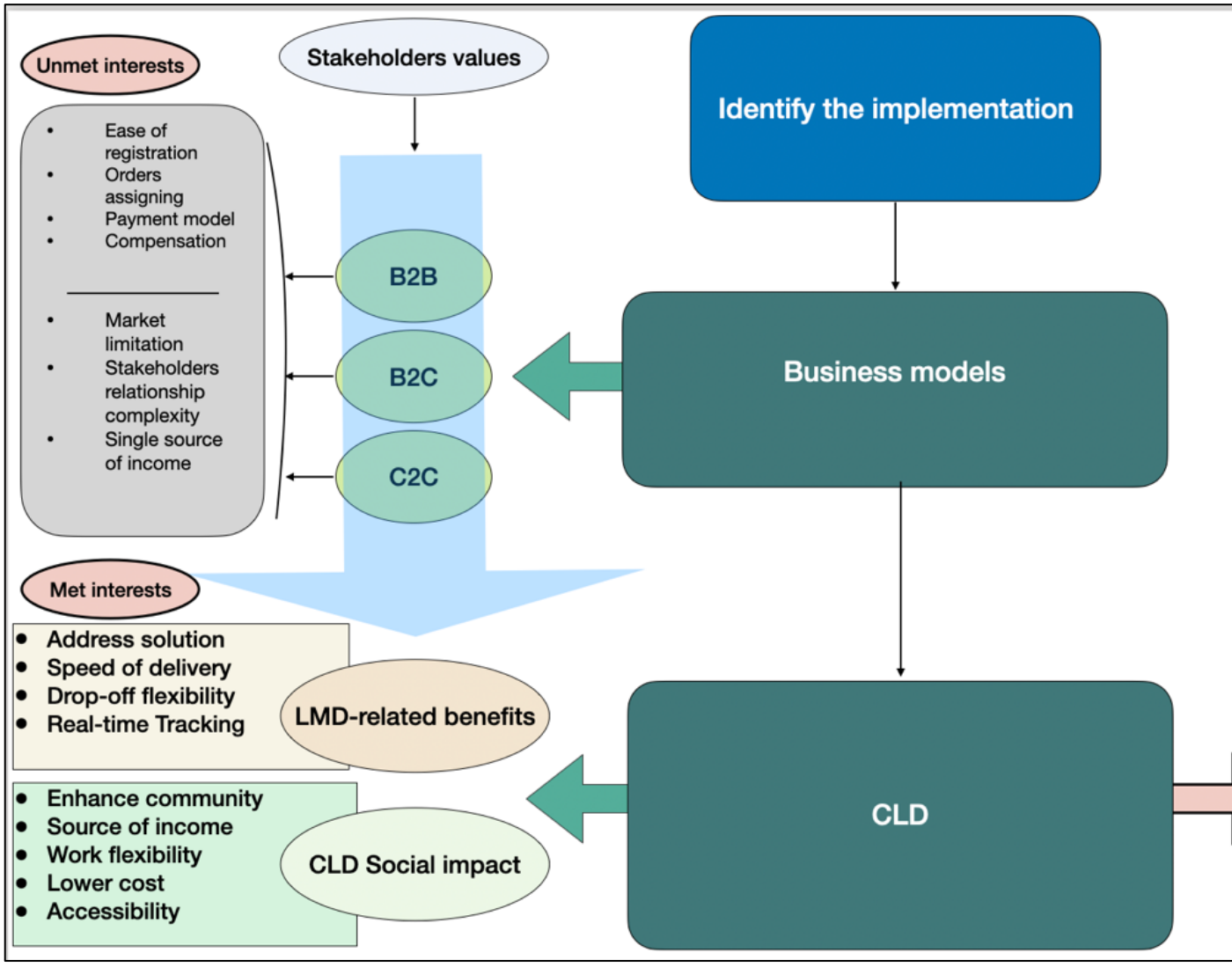


*Figure 33 Stakeholders met and unmet interests*

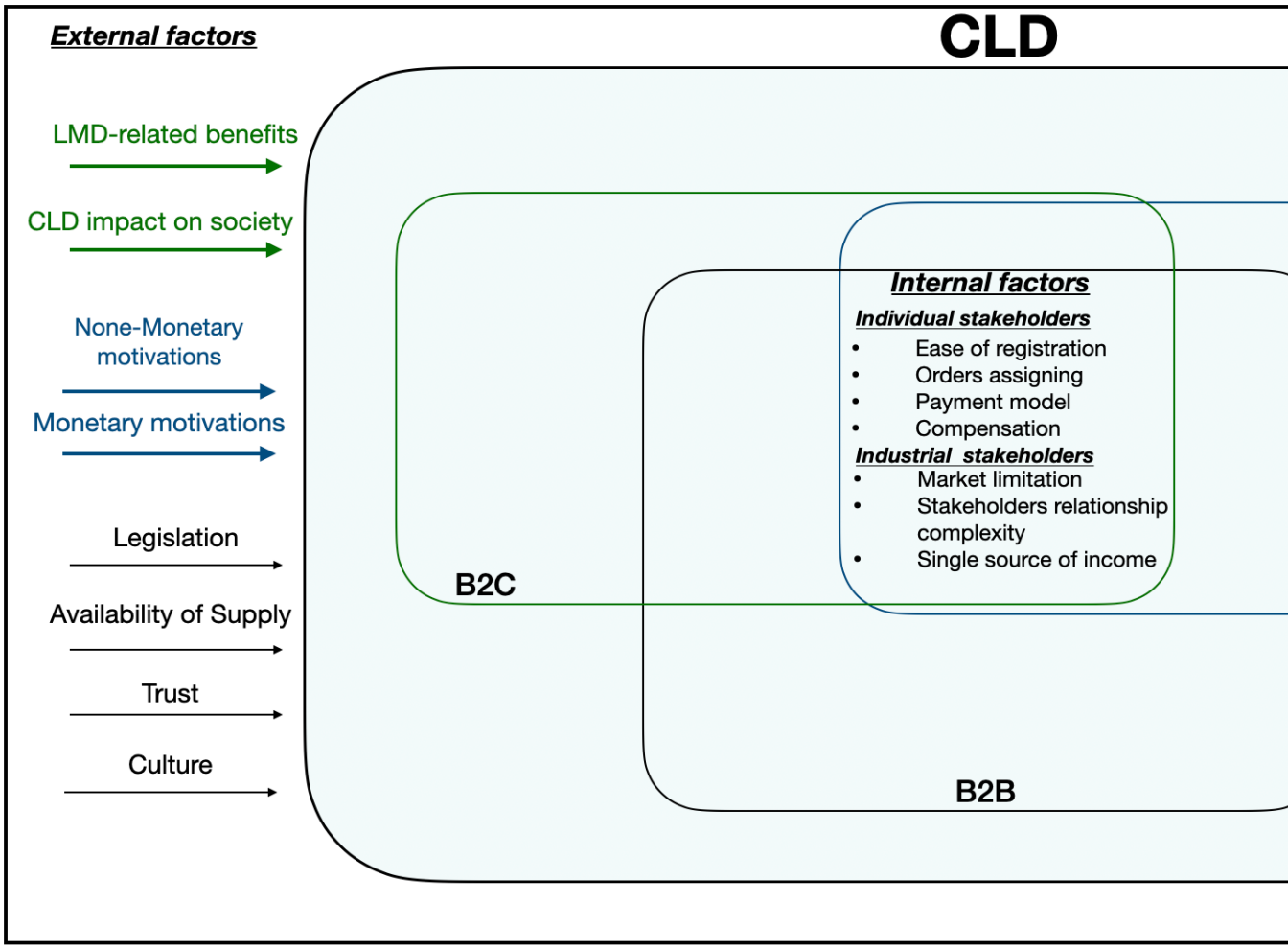


*Figure 34 Summary of the final findings*

# Chapter 6: Discussion

## *6.1 Introduction:*

This chapter will start by recalling the theoretical background and will link it with this study's findings in section 6.2. Then section 6.3 will discuss the lack of studies in the emerging economy context and the contribution made by the findings of this study. Finally, the current findings will be discussed in relation to the literature in sections 6.4 and 6.5.

## *6.2 The study's significance:*

This study was motivated by the literature gap identified in the last mile delivery (LMD) field and the supply chain field in general. The accompanying increase in online purchasing adds to the LMD challenges. Meanwhile, the usage of crowd logistics delivery (CLD) as a last mile solution is increasing at a rapid pace, as confirmed in the literature and empirically in this study, in the contexts of both developed and emerging economies. Although CLD as an LMD solution has been getting more attention from academia lately, considerably more studies are needed in order to cover the different aspects of this topic. This study found that the lack of studies on this topic could be attributed to various reasons, such as the fast growth of the industry, the novelty of the topic, and the difficulties of collecting empirical data. Therefore, this study was initiated to explore the CLD as an LMD solution.

This exploratory study will contribute to the literature by enhancing understanding in the fields of both logistics and physical distribution in different ways. First, knowing how CLD is implemented in different contexts allows us to understand more about its characteristics and its success. Furthermore, the comparison with business models in other contexts will benefit both academia and industry by identifying some previously unrevealed practices that might affect its success. For instance, the B-to-C and C-to-C models are implemented differently from those used by Deliveroo and Uber in the UK, which demonstrates the motivations and challenges that these business models face and hence the potential for their improvement. Second, the study has identified that the stakeholders have different motivations for using CLD that are not necessarily applicable in the traditional LMD, such as benefits relating particularly to LMD and the social impact for the society. Third, it found a lack of motivations towards sustainability that affected all stakeholders involved. Thus, the question arises of how sustainable CLD will become in the study context. Finally, the barriers that face the CLD success as an LMD solution relating to such as trust, security, quality, and culture are revealed. This study has identified

new factors and other factors that are in line with the literature but have been redefined and clarified based on empirical data.

### *6.3 Theoretical background revisited:*

After evaluating the literature in chapter 2, and discussing the importance of involving stakeholders in LMD and CLD in chapter 3, this study was based on various stakeholders' perspectives rather than business perspectives or a particular stakeholder's perspective. Therefore, stakeholder theory is used in this study as a lens for the purpose of analysis, particularly, in identifying the key stakeholders involved. The study followed Mitchell et al. (1997), who argue that not every stakeholder has the same degree of power, legitimacy or urgency in relation to its organisational claims. Stakeholder theory was also used as a lens to analyse the synergised and conflicting interests of the identified stakeholders. Thus, using an inductive case study approach that included different stakeholders' perspectives across three primary stakeholder groups, this study has identified three different CLD practices and a set of internal and external factors that affect the development of CLD as a LMD solution. Further, it addresses the main stakeholders' interests in seeking how best to serve the different interests in achieving a successful CLD as an LMD solution.

This study applies stakeholder theory to an emerging phenomenon (CLD) using an inductive approach by interviewing different stakeholder groups in CLD as a case study in the Kingdom of Saudi Arabia (KSA), to ask How, Why, and What questions. The organisations, in this case, CLD applications, should take into account who their stakeholders are and what they expect of the organisation as they develop their strategic plans (Freeman, 2010). The study identified the stake and the stakeholders for each business model and then the CLD stakeholders in general. Besides, the study examined the perspectives of those stakeholders who are of high importance to the stake. Understanding how stakeholders interpret and interact with the company, how they relate to management and how managers perceive the stakeholders is essential to business success (Friedman and Miles, 2006). In so doing, this study applied stakeholder theory in the area of CLD to a particular problem rather than a single organisation ((Ballantyne et al., 2013) is an example of a similar approach). Stakeholder theory can, however, be interpreted as looking at a single organisation to focus on the threats or interests of different stakeholders (Primary/secondary) rather than the whole field.

If a company can consistently meet or exceed its stakeholder's demands, it will be sustainable (Garvare and Johansson, 2010).

Sustainable business models must be sustainable economically. According to Schaltegger et al. (2011), the aim of sustainable business modelling is therefore to find solutions that enable firms to capture economic value while creating environmental and social value, hence creating the business case for sustainability (Schaltegger et al., 2011).

As Allee (2011) indicates, the important considerations for these stakeholder groups must be clearly expounded. This includes identifying tangible and intangible value flows between stakeholders to define relationships, exchanges and interactions, and opportunities for greater mutually beneficial value creation (Allee, 2011). Porter and Kramer (2011) describe this enhanced approach as 'shared value creation'. Although stakeholders in the present study demonstrated a lack of motivation towards the environmental dimension, CLD met the societal needs and demands. It provides LMD-related benefits and social benefits to the community, to fulfil the main needs unmet by traditional logistics service providers.

### *6.4 Emerging economies:*

This study attempted to fill the gap identified in literature on the emerging economy. In other words, this study looked at the phenomena in relation to different contexts and their characteristics which studies previously had not addressed. Regarding the number of studies of CL in different contexts, Buldeo Rai (2017) stated that while the majority of CL studies were focussed in Europe (20), publications focussed on other areas were also found, particularly in Canada (4), Asia (4) and the U.S. (4) (Buldeo Rai et al., 2017). However, future growth will mainly occur in developing economies in Africa and Asia, where the urban population will rise from around 50 percent to over 66 percent by 2050 as a result of natural growth and rural-urban migration (Cohen, 2015). Demand for CL is expected to increase due to this population growth. This study contributes to the literature by offering a comprehensive understanding of the topic in Kingdom of Saudi Arabia and the Middle East region in general, which is one of the contexts in which there is a lack of studies.

A paradoxical pattern can also be observed worldwide. Massification is a global phenomenon, whereby greater volumes are being transported faster over longer distances. At a city level, atomisation may be observed; smaller volume consignments distributed to more addresses (Macharis and Kin, 2017). This trend contributes not only to the growth of home delivery (Visser et al., 2014), but also to the continued presence of larger numbers of small independent retailers in developing economies (Blanco and Fransoo, 2013). This poses challenges in

achieving effective, efficient and sustainable city delivery (Dablanc, 2007). In addition, as Mair and Reischauer (2016, p. 2) point out, "We know little about how the sharing economy matters for social life... and how the sharing economy manifests differently across institutional and geographical contexts." (Mair and Reischauer, 2016).

As (Dreyer et al., 2017) highlighted, this gap is especially important for emerging market contexts, as they have received little empirical attention in the sharing economy literature, but in these contexts the benefits and risks of such business models are particularly important. Likewise, the literature on business models has highlighted the importance of context and the potential of technology-enabled business models to adapt to a variety of contexts (e.g. (Chesbrough, 2006, Sanchez and Ricart, 2010).

## *6.5 Relation of Findings to Literature:*

### *6.5.1 CLD implementation in the context contributes to solving the last mile delivery issues:*

The study identified the implementation of CLD in the context of the Kingdom of Saudi Arabia as represented by the business models B-to-B-Contract, B-to-C and C-to-C. There are four main differences in these business models, relating to the definition, product flow path, registrations, money generation, and the relevant stakeholders. Although the business models corresponded with those in some other studies in terms of their typology (Rougès and Montreuil, 2014, Buldeo Rai et al., 2018, Rześny-Cieplińska and Szmelter-Jarosz, 2019, Frehe et al., 2017), the *implementations* differ in relation to the context where the study took place. Regarding their definition, B-to-B has been identified as products moving from business to business (Buldeo Rai et al., 2018). In this study it is defined according to the application owners' perspectives, based on payment models. Although the movement of products is between business and customers, the customer is not involved in the agreement or payment to the CLD application. On the other hand, although this study's definition of the C-to-C business model, based on the stakeholders, is consistent with other studies, such as (Rougès and Montreuil, 2014), the implementation is different in this study compared to other studies because of the different context. Rougès and Montreuil (2014) highlighted that C-to-C matches two individuals, one is the sender who sends the package, and the other one is the traveller who executes the task. However, in this study the sender is not necessarily involved, as the receiver may request from an individual or from a business. Thus, a few differences in the business model implementations were identified in this study, especially in the B-to-B-Contract and C-to-C. While Frehe et al. (2017) categorised crowd logistics services into three types: delivery

services, personal transport, and freight transport and purchase, within the scope of this study, the purchase and delivery services are a combination of food shopping, delivery, and e-commerce. Although the naming is the application owner defined the model same in B-to-B, the researcher used the term B-to-B-Contract to separate it from other known B-to-B model in the literature. Furthermore, relevant stakeholders are different. B-to-B in this context acts as third-party logistics (3PL) for LSPs or to deliver to customers who order from e-commerce companies. This is in contrast to C-to-C which is from anywhere to anyone. In other words, the customer could be a business or individual and also can be a sender or receiver. Another main difference in C-to-C as an LMD is that the customer can customise his/her orders from different places. Although the Rześny et al. (2019) study does not explain the details of the implementation of the business model, the implementation of C-to-C business models in their study complies with business models identified in other countries, such as Indonesia where the customer orders anything from anywhere (Rześny-Cieplińska and Szmelter-Jarosz, 2019). Moreover, in the crowdsourced logistics business model identified by Carbone et al. (2017), a sender can obtain transportation services via a mobile application or computer as an independent contractor using a personally owned vehicle asset (Carbone et al., 2017).

The above illustrates the main differences in the implementation in this study compared to previous studies, in naming, registrations, flow of product path, payment models, and compensations. Thus, this study adds to the literature by contributing new insights regarding other implementations of CLD for solving LMD issues.

#### *6.5.1.1 Internal implementation: captured and missed value for stakeholders:*

The findings related to success factors are divided into two main groups: internal and external. The internal factors are those occurring within the CLD business models, whereas the external factors arise within the CLD as an LM solution in general. These factors were also the factors on which all the involved stakeholders commonly agreed. The specific internal factors have to be met along with the external factors in order for a CLD business model to succeed. In other words, since the implementations of the business models are different, each business model has to meet its particular internal factors first, then the external factors. See Figure 35 below.

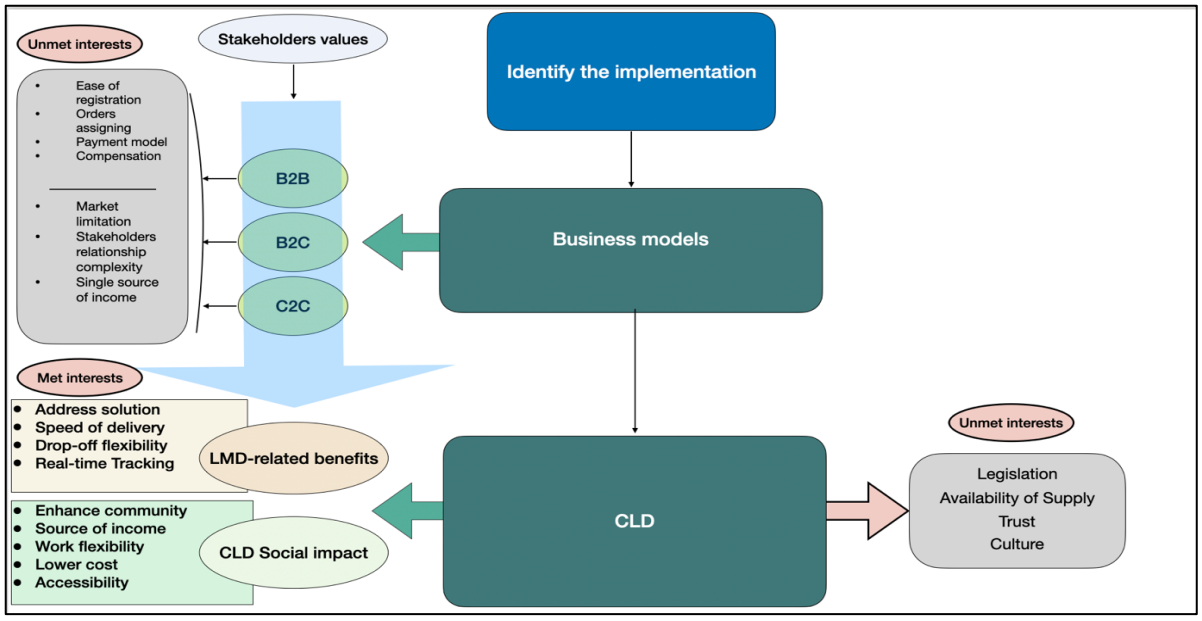


*Figure 35 Stakeholders met and unmet interests*

As the study was focussed on tailoring engagement approaches to the interests and needs of the stakeholders, as individuals or groups, the stake and the stakeholders first needed to be identified for each business model of CLD. The values are categorised as captured values and missed/destroyed values. A value provided to the stakeholders via a business model is a captured value, while a value that is not capitalised or met by a business model is a missed/destroyed value (Bocken et al., 2013). In terms of the sustainability of a business model, sustainable business models aim to go beyond providing economic value and give attention to other forms of value for a larger range of stakeholders (Bocken et al., 2013). However, this study revealed that all the missed/destroyed values in the internal implementations of the business models emanate from the application owners and the drivers, while missed values in the CLD in general are mutual among different stakeholders.

In a sense, the captured values are the motivations for drivers to participate in a specific business model. In general, in crowdsourcing, it is vital to increase the number of drivers/crowd (Antikainen et al., 2010); that being the case, crowd motivation is one of the main topics for consideration (Leimeister et al., 2009). This study found that motivations including monetary incentives, improved knowledge or skill, and personal image building are in accord with the extrinsic motivations identified in the literature. In addition, other motivations, such as pleasure and contributing to the public good, are also consistent with the intrinsic motivations found in the literature (Boudreau and Lakhani, 2009, Antikainen et al., 2010, Leimeister et al., 2009, Bryant et al., 2005). Although firms commonly reward monetarily those who come up with an

innovative concept through formal competitions within the firm (Terwiesch and Xu, 2008), incentives for participants can include other rewards besides the monetary. While researchers recognise the significance of motivation as a factor in the designing phase of crowdsourcing activities, different kinds of motivations have not been adequately explored in various crowdsourcing contexts (Hossain and Kauranen, 2015). In relation to CLD specifically, this study examined the implementation along with what makes a business model attractive to the crowd; in other words, the internal stakeholders' values that a business model met or did not meet. These then are the factors that will impact on the future development of CLD.

*Captured values vs Missed values within business models: Individual vs industrial stakeholders:*

The following missed values *(ease of registration, order assignment, payment model, and compensation)* occurred because the interests of individual stakeholders (drivers/crowd) were neglected by industrial stakeholders (application owners). Those missed values impact on the economic sustainability of the business models as the crowd is a main stakeholder of CLD in all business models and as such affects the supply status.

*Internal factors that influence the business model's attractiveness to the crowd:*

*Ease of registration vs Attendance and training:*

The study found that the three different implementations of CLD represent different business models. B-to-B-Contract has the only implementation that requires attending two-hours training before the driver from the crowd is able to work. Meanwhile, the other two business models, B-to-C and C-to-C, have online registration and no training requirement. The main reason for conducting a training programme, as explained by the application owners, is to enhance the image of the application in the customers' perception by improving the service quality. Thus, training is one of the main success factors for business models, as the effectiveness of crowdsourcing implementation relies on the crowd's quality (Boudreau and Lakhani, 2009). The quality here represents the quality of the last mile delivery (LMD), which lies in the logistics service quality (LSQ) as well as the application's image based on the perceptions of customers. The findings showed how drivers can damage the brand image and the quality and reliability of the services. Furthermore, the differences in quality could be greater than in the case of the traditional delivery implementations since CLD drivers are independent individuals, who are not targeted for official training and are not official

employees in the businesses. This may potentially compromise customer experience (Kannangara and Uguccioni, 2013). A solution provided by the B-to-B-Contract (B1) CLD application is the two-hour training programme, which includes safety, service quality, and customer service. However, although training may improve the service quality, it could be against the drivers' interests, as they look for the easiest way to gain money and do not regard having to complete an application's training programme as an attractive proposition.

Some CLD applications use technology to link drivers with customers and integrate training and performance assessments for CLD drivers into provision of customer service. While this CLD application provides many benefits, such as registration and tracking of the crowd, it is harder to control and ensure the quality of service (Buldeo Rai et al., 2017). Hence, the study also concludes that while training improves CLD service quality and increases customer satisfaction, it also affects crowd participation, as it deters drivers from registering because training is not a requirement in other business models. Crowd participation, therefore, has a major effect on supply and demand, which is one of the main issues facing CLD in general. Hence, it is a threat to CLD economic sustainability. *Both will be discussed further in the supply and demand and trust sections: 6.5.2.2 and 6.5.2.3*

*Order assignment:*

The study shows that order assignment plays a role in making the business model attractive to the crowd. This study identified three ways/models for assigning the crowd to the last mile task: assigning based on location, self-check, and bidding, the latter being part of the payment element of a business model. Location-based and bidding-based assigning are the types most commonly used in CLD. However, unlike other models, which use a platform for assigning orders to drivers, the B-to-B-Contract (B2) business model uses self-checking (traditional method) as the way of assigning drivers. In other words, (B2) drivers have to come and check for available items for the last mile delivery task. This traditional method is not in line with crowd preferences.

The three assigning models this study identified are in line with those of previous studies except for the self-checking method. Examples of those studies that matched these findings are Carbone et al. (2017) and Ermagun and Stathopoulos (2018). They showed that management of the platform's logistics activities may be coordinated in a centralised or decentralised way. The crowd sourcing applications therefore are provided through a variety of approaches that match the service requester and courier, ranging from centralised to decentralised. In a

centralised approach, the platform matches a sender and courier with algorithms which optimise the delivery probability. This approach therefore matched the location-based method found in this study. Another study, by Buldeo Rai et al. (2017), used the term trajectory-dependency to refer to the same definition of a centralised approach. It could be claimed that trajectory-dependency enables more sustainable use of pre-existing trips, while random selection requires additional trips (Buldeo Rai et al., 2017). Meanwhile, the bidding-based model in this study is similar to the decentralised approach identified in the Ermagun and Stathopoulos (2018) study where a sender chooses from a list of available couriers who bid on the request. Whereas a decentralised platform only plays an informative role, a centralised administration deals with flows and sends information to the public (Carbone et al., 2017, Ermagun and Stathopoulos, 2018).

Several authors (Arslan et al., 2019, Paloheimo et al., 2016, McInerney et al., 2013, Archetti et al., 2016, Rougès and Montreuil, 2014) have clearly indicated the linkage of order assignments to pre-existing travel routines (McInerney et al., 2013), commuting trips (Rougès and Montreuil, 2014), or delivery locations near the driver's destination (Archetti et al., 2016). Without the utilisation of current vehicle flows, unnecessary travel may be induced (Chen and Chen, 2016).

Chen et al. (2014) differentiate between wide coordination of tasks, on the one hand, where the application actively suggests distributing duties to the crowd/drivers in a well-coordinated way, and crowd tasks that are predicted, on the other hand, where the recommendation is not focussed exclusively on current locations (Chen et al., 2014). In terms of sustainability, orders assigning plays a significant role in CLD sustainability. CLD can be an economically beneficial and sustainable alternative, but it is dependent on the network's spatial features and schedule of drivers. Furthermore, designing the task selection in such a way as to minimise delivery time and maximise efficiency is a large obstacle (McInerney et al., 2013). Thus, assigning orders lies within the economic and environmental dimensions (Buldeo Rai et al., 2017).

*Payment models:*

One of the main internal interactions between industrial and individual stakeholders occurs in the payment model. Rougès and Montreuil (2014) revealed five revenue models: fixed price, negotiated price, resale margin, membership, match or finance fees. Hence, it is crucial to design a qualified payment model for CLD (Rougès and Montreuil, 2014). However, this study has identified three types of payment model: fixed (B2), distance-based (B1 & B-to-C), and bidding-based. Only the distance-based model is in agreement with the Rougès and Montreuil

(2014) financial compensation definition. However, the broad definition and lack empirical data in the Rougès and Montreuil (2014) study is problematic. Therefore, the empirical findings in this study provide a new understanding of these payment models from different perspectives. This understanding can be beneficial for both academia and industry. In terms of the other types of payment model, although the fixed price term found in this study is in line with the Rougès and Montreuil (2014) findings (also recognised a fixed price revenue model), it is defined and implemented differently. In their definition the range of prices is different and extra charges may be applied depending on different factors, unlike in the fixed (B2) model in this study where the price is fixed regardless of the distance or any other factors.

The payment model in this study has an impact in two ways: individual participation (mainly crowd) and environmental. A major challenge is the implementation of an efficient cost model. It is based on crowd features including transport movement, motivation and modal preference (Archetti et al., 2016). The payment model also plays a role in a business model's sustainability. A sustainable business model relies on well-designed revenue and cost structures (Savelsbergh and Van Woensel, 2016b). Many authors assume that costs are reduced due to CL's operational flexibility and light assets in the infrastructure (Botsman, 2014a, Qi et al., 2018).

Interactions between stakeholders in the payment models occur in all three payment/revenue models. In the fixed-based (B-to-B-Contract) model, the drivers are generally unsatisfied with the model created by the application owners. In contrast, in the bidding-based model the payment model in general is acceptable, but drivers do not like the minimum payment required to get the orders. Application owners, on the other hand, are affected because drivers offer the lowest prices regardless. Another significant aspect of the bidding-based model is its importance in the existing crowdsourcing applications. Although this study does not deal with the cost of implementing these payment models, it is important to highlight this significant aspect of the bidding-based payment model. Ermagun and Stathopoulos (2018) highlighted that, theoretically, implementing a negotiated bidding system is more expensive for a crowdsourcing operator because of the more complicated algorithms and attempts to enforce agreed price-offering strategies. On the other hand, these systems are necessary because some empirical research has indicated that peer-to-peer negotiations lead to sub-optimal platform efficiency. However, this conflict between the need for easy pricing / selection scenarios that are appropriate to crowds and the ambition for optimum strategies based on sophisticated

central procedures requires a better understanding of the relationship between the actions and motivations of the crowd and the new technological navigation platforms (Le et al., 2019).

Economically, this study revealed that in the case of the bidding-based model, customers enjoy having an opportunity to negotiate, and drivers like the feature of being able to increase and sometimes lower the price based on time, distance, and demand. Hence, there is a perception among both customers and drivers that this is the best model for them. However, as a drawback, application owners often lose out because they are unable to control the process. In addition, with the bidding model of charging, there are limitations when it comes to the collection of payments. Similar to the findings from Le et al. (2019), another limitation of this model identified in our study relates to the impact it may have on the demand and supply, in a way that some drivers offer a minimum price just to get the job whether for economic or social purposes, such as socialising. As a consequence, some drivers cannot compete with those drivers offering a minimum price, and they move to another platform or business model. This shows that there is a need for considerable improvement of the business model, in order for it to be successful, sustainable, and attract more drivers.

In contrast, the distance-based model is the best for drivers in terms of covering the travelling distance cost. However, as it ignores other factors like time of the day the order is made, and the current status of supply and demand, the price will not always be attractive for drivers especially if the store is not close by. Simultaneously, the price may not be convenient for customers either, especially when the delivery fees are higher than the value of the products that are being delivered. The bidding system creates the opportunity for attracting more drivers and customers, as it is not a location-based type of model. This study indicates that the current payment and charging model requires improvement, as it has major implications for economic sustainability. In terms of the bidding-based system's impact on the environment, it is not a location-based type of model; instead, it is price-oriented. This means that the receiver and sender/driver are matched based on the price agreed rather than the location or destination between these two individuals. Hence, unlike other models in the study, it is not a location-based model, and in terms of the supply and demand issue and crowd participation the focus is on economic benefits rather than the environmental impact.

Although each payment system and charging system has its strengths and weaknesses, improving the payment model will contribute to enhanced economic and environmental sustainability. Thus, the study has contributed to the current knowledge by showing the wider impacts these models have. These findings do not comply with (Buldeo Rai et al., 2017) study

which reports that the revenue model has only an economic impact. Overall, the findings illustrate that the payment and charging models in business model implementation play a large role in making the CLD application successful.

*Compensation*

The CLD implementation findings reveal that compensation upon cancellation is not an obvious feature implemented in all CLD business models. For drivers, a business implementation model with the compensation feature is more attractive than others without this feature. Specifically, interviewees agreed that the C-to-C implementation model, which matches two individuals while the CLD provider is 100% mediator, does not compensate drivers when customers cancel the LMD trip. Although this business model is becoming increasingly popular and its drivers get more orders than in the other models, compensation is still one of the main factors that makes drivers choose another business model. Compensation is thus an important factor in making a business model successful. This finding is consistent with various previous studies that highlighted that the crowd depends on monetary and non-monetary incentives (Carbone et al., 2017, Mckinnon, 2015, Rai et al., 2017, Rougès and Montreuil, 2014). In terms of sustainability, compensation plays a role in the social dimension as well. In other words, compensation contributes to improving people's standard of living.

*Industrial stakeholders' missed values:*

*Application owners in implementation:*

*Market limitation:*

Rześny-Cieplińska and Szmelter-Jarosz, (2019) measured the market limitation by calculating the number of served regions / cities, as a sign of business performance as well as popularity of the solution (the same crowd logistics platform was accessible in many cities, such as those of famous cafés or fast-food restaurants) (Rześny-Cieplińska and Szmelter-Jarosz, 2019). In relation to market limitation, A B-to-B-Contract business model application stated that geographical limitation is a missed value for the implementation of this business model, which is in line with a variety of studies. Geographic scale is related to the size of business and the distances covered by the CL. Differentiation can be made between intra-urban and inter-urban on the one hand and regional and international scale on the other (Rougès and Montreuil, 2014, Buldeo Rai et al., 2017, Mladenow et al., 2016). In general, the literature limits the crowd

logistics definition to city and last mile logistics (Arslan et al., 2019, Chen and Chen, 2016, Hübner et al., 2016, Mehmann et al., 2015, Mckinnon, 2015, Slabinac, 2015, Mladenow et al., 2016). In our study, however, the differentiation depended on the solutions selected, ranging from local solutions (transport in one town) to regional deliveries. It showed that the C-to-C business model is not limited to inside the city, but also covers outside the city region. As interviewees mentioned, LMD trips are also made between cities, depending on the bidding price and match between individuals. In the B-to-B-Contract case, the LMD task is paired with the location of the distribution centre/warehouse of the LSPs or e-commerce that it has a contract with. In terms of economic sustainability, geographical scale relies on the possibility of selecting a certain geographical region (Buldeo Rai et al., 2017, Rześny-Cieplińska and Szmelter-Jarosz, 2019). Regarding crowd logistics in a city area, finding sustainable solutions to market limitation of service is hence not as obvious as it may seem to be.

*Individual stakeholder relationship complexity and single-source income:*

The B-to-C and C-to-C business models involve both the driver and customer as individual stakeholders, unlike the B-to-B-Contract business model. Both of the individual stakeholder groups are of high salience to the stakeholder (in B-to-C and C-to-C business models and hence CLD). The stakeholder perspective explains the most important stakeholder claims and how saliency impacts their CLD business model (Mitchell et al., 1997). The findings suggest that the viewpoints of the individual (drivers and customers) stakeholders and the application owners' viewpoints cannot be presumed to be similar. In addition, the stakeholder relationships cannot be completely understood without taking into account both the parties involved, in this case the individual (drivers and customers) and industrial (the application owners) stakeholders' viewpoints. The findings of this study indicate the complexity of dealing with customers and crowd/drivers at the same time and the difficulty of strengthening the relationship with individual stakeholders. That includes the claims identified in this study and beyond. The stakeholder group's interests and/or identity may also lead stakeholders to behave in ways that affect the management of the relationships between the stakeholders (Rowley and Moldoveanu, 2003).

Another limitation of the C-to-C business model is having a single source of income from only the drivers, unlike the B-to-C where the revenue comes from two different sources. Increasing the satisfactions by meeting the demands of both individual stakeholders (drivers and customers) is therefore even harder than with other CLD business models.

### *6.5.2 External factors (Impact on the CLD overall):*

#### *6.5.2.1 Legislation:*

*Industrial vs institutional stakeholders:*

Legal concerns are another barrier for the application owner stakeholders that impact on the success of CLD. Industrial stakeholders in this study highlighted two problems that occur because of legislation issues. First, requirements such as a prerequisite to have a delivery licence make the implementation more difficult. Second, unequal competition occurs among LSPs and CLD business models. Thus, legislation can have a major influence on the implementation of CLD, which can be either good or negative. As an example, in some Chinese provinces, there is a prerequisite for at least 30% of the drivers in a delivery business to have a delivery licence (Lam and Li, 2015). However, CLD companies were suspended in 2014 because they were operating before getting approval (Lam and Li, 2015). In this study, legislation was found that required licencing of both drivers and CLD providers, thereby highlighting the significant impact of the requirements on the CLD.

On the other hand, the institutional stakeholders consider the legal issues in two different ways. First, the fast growth of CLD makes it difficult to regulate and to introduce new policies before the industry takes another step forward. That is also due to the procedure of legalising such laws, which have to be approved by different ministries. Second, the huge demand that has encouraged illegal practices in the market has led to security issues. *Illegal issues and security fall under the trust issue. They will be discussed in the trust section 6.5.2.3 that presents the findings in this regard*. Legislation is a concern in the U.S. market as well. In the U.S. you may send a shipment to be shipped across state borders, but while the goods in the package may be legal in the state from which it is shipped, they may be illegal in the destination state. For instance, some drugs are legal in Colorado (USA), whereas they are illegal in other U.S states (Le et al., 2019). In addition, crowd sourcing providers also face legal problems relating to theft and fraud (Hübner et al., 2016). Hence, the growth of the CLD industry mainly depends on institutional policies. Decision makers are in fact urged: (A) to establish policy framing and legislation to regulate the CS industry and reduce CLD operational insecurity; (B) to define a clear boundary between peer-to - peer share and business activities in order to assign subsidies to the related parties; and (C) to provide innovation subsidies to promote CLD industry growth (Le et al., 2019). Furthermore, industrial stakeholders should collaborate and communicate with institutional stakeholders to overcome these barriers.

*6.5.2.2 Availability of supply:*

The study showed that the crowd is a definitive stakeholder in all CLD business models. Besides, it is obvious that new supply (crowd/drivers) is constantly needed for CLD, which is different than in the traditional delivery processes, where drivers are full-time employees and on the payroll of an LSP. Hence, drivers should be available whenever appropriate (assuming proper planning processes). In a CLD situation where drivers are engaged in the market often on a voluntary basis, CLD providers must take into account their availability and preparedness for work.

The findings show that there is a need to involve decision makers, drivers, and customers as main stakeholders to overcome these challenges. The institutional stakeholders play a large role to facilitate the involvement of supply (crowd) to the industry in terms of regulations and requirements. Industrial stakeholders highlighted the challenges they faced to acquire the supply due to some of the regulations. Industrial stakeholders, on the other hand, also require the involvement of individual stakeholders (both customers and drivers) to know what makes a business model or application more attractive, such as a payment model and compensation, as has been revealed in the study. Hence, all stakeholders play a role in overcoming this challenge of CLD as an LMD solution. The findings are in line with other previous studies in terms of the challenges for all business model application owners. As previously stated in the internal factor section, in crowdsourcing, it is vital to increase the number of drivers/crowd (Antikainen et al., 2010). In crowdsourcing, therefore, crowd motivation is one of the main topics for consideration (Leimeister et al., 2009). A sustainable business model demands a huge database of people or a critical mass to stay competitive throughout the peaks, for example, during holidays seasons (Hodson, 2013, Rougès and Montreuil, 2014). Chen et al. (2018) argue that CL can be a feasible and sustainable economic alternative, but it depends on the spatial features of the network and the drivers' schedules (Chen et al., 2018). Designing allocation of tasks in a way which reduces delivery times and maximises productivity represents a major challenge in this area (McInerney et al., 2013). The crowd sourcing literature indicates that the choice of an optimal platform strategy requires the consideration of how large the demand and supply pools are and how well they match in terms of volume, socio-demographic, and preferences (Le et al., 2019). For crowd sourcing businesses, demand forecasting is essential so as to have an adequate supply for the anticipated demand. Many on-demand food and food shipments companies (e.g., UberEats, Seamless, GrubHub, Doordash, Instacart, Postmates and

Deliv) are in development. These involve common peripheral products or other small shipments that have a tight time window or require an urgent delivery (Le et al., 2019).

In terms of sustainability, the supply, represented by the crowd, lies in the economic dimension, as the solution mainly depends on it.

*6.5.2.3 Trust:*

Trust is one of the main factors that impacts on the growth of CLD. The main obstacles that crowd sourcing faces include theft, loss and damage, and exposure to illegal activities (Mckinnon, 2015) and privacy issues (Mladenow et al., 2016). The study found that trust is an issue in CLD, which is in line with a variety of studies (Rougès and Montreuil, 2014, Punel and Stathopoulos, 2017b, Buldeo Rai et al., 2017, Punel et al., 2019, Le et al., 2019, Frehe et al., 2017). However, this study revealed that trust is seen differently by the various stakeholders. The main reason trust is an issue is that the LMD task is implemented by the crowd. Trust in individual stakeholders, customers specifically, is seen as compliance with delivery time, damage and loss, and honesty. This is in line with findings from Le et al. (2019) who highlighted that senders (in our case customers, as customers can be both sender and receiver depending on the business model) are concerned about time and damage to the package shipped. Looking at how drivers see trust, our study found that they see trust as honesty by customers as well as relating to illegal and unsafe goods packages. That is also consistent with Le et al., (2019) who identified the time taken and damage to the packages shipped, and that drivers may be concerned about unsafe or illegal goods (Le et al., 2019). However, this study found that drivers see trust as depending on honesty on the part of customers in giving fair rating and reviews of their service, because this impacts on drivers' work reputation and therefore drivers' income and future work. Only one driver mentioned concerns about illegal items. On the other hand, the industrial stakeholders see trust as affected by damage, loss, and the stealing of items. As mentioned in the quality section in the previous chapter, businesses are now implementing procedures to ensure that their services build customer confidence and security, such as training and follow-up in the case of (B1) and rating system in the other models identified in the study. Carrying out background checks on drivers is another procedure implemented by other CLD businesses (e.g. UberRUSH and Deliv); however, this was not revealed to be a practice in our study. However, application owners highlighted the level of trust as being lower compared to the previous year.

Trust is among the CLD legislation concerns of institutional stakeholders. Decision makers see it through the security lens in terms of individual stakeholders (customers and drivers) who send, receive, and deliver illegal items and substances. Moreover, lack of trust is one of the main factors which complicates the implementation of regulations and requirements.

In general, trust is one of the major factors influencing CLD. Frehe et al. (2017) emphasise that the usability, customer trust in CLD providers and the service, are central features for growing demand. In this sense, trust plays a role in the supply and demand issue, as mentioned above. However, no information on the specific effect of these factors or on the existence of any other dominant features is currently available (Frehe et al., 2017). Rouges and Montreuil (2014) found that trust between drivers and the platform can significantly motivate or discourage the ongoing participation of drivers (Rougès and Montreuil, 2014). Thus, the present study not only showed that trust has an impact, it also explained these impacts and how different stakeholders perceived trust differently, which answered calls from (Punel et al., 2019). In terms of trust as a sustainability dimension (3BL), (Rześny-Cieplińska and Szmelter-Jarosz, 2019) categorised trust as a social dimension, while (Buldeo Rai et al., 2017) classified trust as a dimension of both economic and social sustainability. Finally, trust in relation to payment is different from trust as discussed previously. For example, the study showed there were trust concerns from the drivers and customers over online payment systems. Cash on delivery is the preferred payment method among customers, which may increase the inefficiency of the last mile process. That is an issue in developing countries, as the legal system needs to be strong enough to assure protection of individuals who are involved in e-service (Keoy et al., 2006). Devari et al. (2017) stated that trust of the crowd is one of three influencing factors of crowd logistics, the others being.

*6.5.2.4 Culture:*

Different norms exist in western societies, where the crowd logistics idea originated, compared to emerging economies that are the focus of this study. Therefore, the success of an online crowdsourcing platform depends on the cultural tightness (Chua et al., 2015), which is defined as the strength of social norms and sanctions in a particular society (Gelfand et al., 2006).

Hence, the culture and ethics in a country may have a major impact on crowd logistics (Frehe et al., 2017). The definition of culture adopted in this paper is a set of shared knowledge, norms, values, and beliefs that unite a collective group, such as a country, and form a cognitive and motivational identity (Chiu and Hong, 2006).

Culture is a social factor that impacts on CLD development, according to Rześny-Cieplińska and Szmelter-Jarosz (2019), but their claim has not been empirically tested. Additionally, Mladenow et al. (2016) showed how cultural aspects can influence how people contribute or interact with each other in location-based crowdsourcing. For instance, the Japanese 'Hayabusa' as well as the American 'Ghostbusters' Lego product line crowdsourcing outcomes were found to be strongly influenced by the crowd sources' personal cultural backgrounds.

Although CLD provides economic (Rougès and Montreuil, 2014, Arslan et al., 2019), social (Mladenow et al., 2016) and environmental (Buldeo Rai et al., 2017, Rześny-Cieplińska and Szmelter-Jarosz, 2019) value to its stakeholders that is vital for its success, the study showed that CLD also faces challenges related to culture that impact on its success. The study has shown how CLD could be affected by culture in this context and how the perceived impact of culture varies among stakeholders.

Using a qualitative method, the study revealed how stakeholders perceive the influence of culture and how meeting cultural norms provides stakeholders with value and a better chance of success. It shows how cultural awareness can be used to gain competitive advantage, by application owners developing and implementing strategies to overcome last mile delivery issues. The stakeholders' perspectives presented thus far support the idea that culture impacts on CLD sustainability in four ways:

Privacy:

Privacy is one of the main issues that faces CL (Buldeo Rai et al., 2017, Mladenow et al., 2016). Privacy has been discussed as a protection for the user from sharing their location in crowdsourcing delivery (Schreieck et al., 2016). Our study revealed that culture influences perspectives of privacy in CLD and the LMD field. Specifically, if culture is not considered in the communication and interaction of drivers and customers, it may be a barrier for CLD growth. Lack of formal contact between suppliers of logistics services and the customers (individual customers) of their customers (retailers) leads to a lack of information about the delivery service (date, time, location) which can affect its success (Rai et al., 2019). While CLD implementations by their nature allow a certain level of communication between drivers and customers, this is seen as a challenge by both customers and drivers. In addition, this study found that customers have concerns about the sharing of their personal information, home addresses and purchase habits, which is in line with the findings from (Fatnassi et al., 2015).

Handling:

The handling of the delivery encounters cultural challenges caused by the interaction between opposite genders that consequently can make delivery inefficient. It may also cause increased environmental impact due to higher fuel use and emissions, increased economic impact as drivers may not be able to take other orders, which reduces their income, and social impact when drivers or customers may feel embarrassed. This shows that the handling of culture needs to be considered for successful CLD.

Lack of environmental motivations or plans:

The choice of an environmentally friendly transportation mode, such as the bicycle, is one of the main factors of CLD sustainability (Buldeo Rai et al., 2017, Rześny-Cieplińska and Szmelter-Jarosz, 2019). However, this option does not exist in any of the current business models of CLD. While the motivation of some stakeholders in using CL is to reduce the environmental impact (Rai et al., 2019), this study found no environmental motivation among stakeholders in this developing economy. Citizens such as those from emerging economies covered in this study are more accepting of environmental risks and do not prepare for the future in the same way as people who live in more developed societies. This could be explained by a sense of fatality. Fate is a complicated concept in the society where the study took place. Regardless of its complexity, interviewees acceptance of all environmental risks come from their acceptance of control of the environment and all conduct as coming from God (Kabasakal and Bodur, 2002). Moreover, it is common for people to justify their non-sustainable use for institutional reasons: decision makers have not restricted the use, manufacturing or import of unsustainable products with regulation and tax (Eckhardt et al., 2010). Therefore, culture impacts on the way the society thinks about the environment. Punel et al. (2018) claim that in terms of attitudinal motivation, people who feel strongly about the community and environment are more likely to use CLD. However, this is not the case in the present study, as the interests of stakeholders interviewed differed with regard to environmental concepts, and no evidence was found of using CLD for environmental reasons. Similarly, Buldeo Rai et al (2017) highlighted that the crowd can be motivated by a clear financial gain or by sustainability matters (Buldeo Rai et al., 2017), which is also not the case in this study. Furthermore, the study shows an absence of short or long-term environmental planning by either industrial or institutional stakeholders, as well as a lack of incentive and interest regarding the

environment among individuals. Hence, the influence of environmental considerations is not as strong as in western countries.

The study shows that adapting CLD towards the respective culture in which the service is implemented will increase its value to stakeholders and enhance overall success and sustainability of the CLD service. Cultural differences may be a barrier for CLD implementation depending on the context. For instance, a business model that works in the U.S. might not work in the EU due to cultural differences and diversity in payment expectations (Le et al., 2019). This is in line with previous studies on innovation and IT, such as that by Chua et al. (2015) who found that innovative solutions have a better chance of success if the cultures of the source and target audience match (Chua et al., 2015). Similarly, Gargeya and Brady (2005) argue that the failure of software can be primarily caused by a lack appropriate cultural and organisational readiness (Gargeya and Brady, 2005).

## *6.6 Captured values: Why do Stakeholders use CLD?*

Based on the previous literature, individuals use CLD due to the speed of delivery, lower costs, “personalised" experience of service and other creative and distinctive factors of the CLD models (Rougès and Montreuil, 2014)

The question of why stakeholders use CLD contributes to the understanding of crowd motivations as represented by the value the CLD provides to them. CLD relies on crowd participation, on the one hand, and customers, on the other hand, who are the high salience class stakeholders. The study showed that customers use CLD as an LMD solution depending on the LMD benefits and the social values the CLD provides to the community.

### *6.6.1 LMD-related benefits in relation to all stakeholders-*

One of the main external reasons for stakeholders to use CLD is the LMD related benefits. However, these LMD-related benefits gain more significance and impact due to the contextual factor of address issues. Thus, although this section is about LMD-related benefits, it will start by highlighting the address issues in this study and previous studies. Then the benefits of LMD will be mentioned.

In contrast with developed countries, the last mile delivery system is still in its infancy in KSA. In KSA, the method of delivery was far from reliable and effective in comparison to developed

countries. No known addresses had been identified in homes and workplaces before 2005. People used to collect their mail from the post office (Alfuraih, 2008). The study showed that the address is still one of the main issues stakeholders face in the context of LMD. Furthermore, all stakeholders are confronted with this issue, including individuals, industry, such as LSPs and e-commerce companies, and institutions. In terms of institutions, the address system is complex, which led industrial stakeholders such as LSPs to create their own grids and zones, which resulted in creation of various address systems for the same location. This has caused confusion for both industrial and individual stakeholders in terms of communication and resulted in delays in delivery. This is in line with the study by AlGhamdi & Drew (2011) who concluded that the lack of a unified address system causes a lack of trust in the entire postal system (AlGhamdi et al., 2011).

The Saudi Post has initiated a large national project called "Wasel," aimed at installing mailboxes in each building. This enabled timely mail delivery using intelligent satellite mailboxes and GPS technologies. However, as stated by the Communication and Information Technology Committee, this project was still not reliable (CITC, 2010). In 2014, customers remained unsatisfied and stated that for e-commerce in the country it was one of the major obstacles (Bahaddad et al., 2015). As a result, several global commercial companies that provide service in KSA, such as Aramex, DHL and FedEx, have established themselves over the years. However, these businesses had to adjust their way of LMD, in comparison to the efficient business process they had built in developed countries. As addresses in KSA are still without clear specific street details, they rely heavily on customers' phone numbers to arrange drop-off and pick-up (Makki and Chang, 2014).

The institutional stakeholders in this study revealed that the address system has been improved dramatically from the past by the creation of the National Address. Furthermore, the Saudi Arabian government has made great efforts to improve the address system by enabling any location in the country to be identified to an accuracy of 1-meter square.

The individual and industrial stakeholders interviewed revealed that the complexity of addresses and the language barrier contribute to making the address a major LMD issue in terms of such as communication cost, privacy issues, and inefficiency. Again, the statement by (Le et al., 2019), namely that CLD business models may have different applications and implementation depending on the context, applies to the LMD issue.

CLD on the other hand can overcome the address complications that result in privacy issues and inefficiency. Hence, the study found that CLD has become a favourable LMD solution for

all stakeholders. Furthermore, all CLD business models provide stakeholders with LMD benefits, such as speed of delivery and drop-off flexibility. Besides, the individual participation was influenced by internal factors, such as the payment model, compensation, registration process. In addition, external factors such as trust and culture also played a role. However, crowd participation depends heavily on actual income. The amount paid to drivers is thus a main driver for crowdsourcing success and willingness to participate (Rougès and Montreuil, 2014, Le et al., 2019, Lindawati et al., 2014, Punel et al., 2019, Ermagun and Stathopoulos, 2018). Similarly, Paloheimo et al. (2016) have found that rebound effects such as drivers travelling longer distances, motivated by monetary compensation, will minimise environmental improvements (Paloheimo et al., 2016). Although monetary reward is one of the main motivations for drivers to undertake longer distance journeys, this will limit environmental improvements (Paloheimo et al., 2016).

### *6.6.2 CLD's impact on society:*

The second theme in the captured external value for stakeholders in using CLD as an LMD solution is the social benefits that CLD provides to the community. The study revealed that stakeholders use CLD as an LMD for a variety of social reasons, such as enhancing the community and supporting drivers, providing work flexibility and as a source of income for different stakeholders, as well as the lower delivery cost, greater accessibility, and transportation opportunity CLD offers. The findings are in line with different studies. For example, Macharis and Kin (2017) also suggested that crowd logistics will provide all of the stakeholders with advantages in the LMD process (e.g. improved customer services, additional revenues for platform providers) (Macharis and Kin, 2017). Meanwhile, the crowd may gain both monetary and non-monetary rewards during the participation process (Mladenow et al., 2015, Bayus, 2013, Ye and Kankanhalli, 2017).

## *6.7 How the business models cover the Triple Bottom Line areas:*

In order to identify the advantages for stakeholders provided by the CLD implementations, the sustainability of the three business models of CLD are assessed and compared with the reported benefits from the literature reviewed in Sections 3.1.6 and 3.2. Although the analysis is split into the 3BL categories, there is some crossover between these categories. For example, interaction between the driver and the customer provides social and economic benefits.

*Economic Benefits*

Economic benefits are often the primary motivation for adopting collaborative business models (Sampaio and Sampaio, 2015). Although other factors such as social awareness are important and can be more important in some cases (Carbone et al., 2017), a business model with low economic benefits is unlikely to be sustainable.

As reported in Section 5.4.4 the CLD implementations provide individual and industrial stakeholder groups with advantages through faster delivery, as identified previously by (Botsman, 2014a, Arslan et al., 2019, Chen and Chen, 2016) (see Table 6 point 7). The faster delivery allows drivers to make more deliveries and hence increase their income, while it results in higher turnover and lower inventory costs for retailers and LSPs ( Table 6 point 8's attractive revenue model). The CLD implementations provide a solution to the high level of undelivered items as a consequence of the address problems (see Section 5.4.4.1), further reducing costs and making the delivery service more efficient (Table 6 point 12). In addition, more flexibility is an advantage identified by stakeholders (Table 6 point 8). However, flexibility in the context of Saudi Arabia is different to that of other countries, particularly that of developed countries. It refers to the drop-off flexibility that allows fewer deliveries to unattended homes (see Section 5.4.4.5). Again, this brings economic benefits to stakeholders (Table 6 points 11 and 12, Table 7 point 9), as does the greater variety of goods that can be delivered (Table 1 point 6) mentioned by application owner LA in Section 5.2.3.

While all models meet the criteria of speed of delivery, the revenue model is one of the main economic criteria that differentiates the sustainability of the CLD models. This study revealed that in the case of C2C, customers enjoy having an opportunity to negotiate, and drivers like the feature of being able to increase and sometimes lower the price based on time, distance, and demand. Hence, there is a perception among both customers and drivers that from an economic viewpoint this is the best model for them. However, despite some advantages for the CLD provider implementing a C2C business model in providing greater platform efficiency, it is a more expensive solution for the CLD provider (Ermagun and Stathopoulos, 2018). Application owners may also lose some control over the process and miss out on revenues. Moreover, since the crowd is frequently focused on economic benefits, this could result in business transactions that have a negative environmental impact if it leads to an increase in unsustainable levels of supply and demand. B-to-B-Contract and B-to-C are likely to be more sustainable when considering a wider geographical scale. However, even if it can compensate the higher costs for deliveries over longer distances, economic sustainability is low due to the higher price and delivery fees for drivers and customers.

*Social Benefits*

In Saudi Arabia, there is generally a higher level of communication between the driver and the customer than often happens in developed countries (Table 6 point 4, Table 7 point 2). Besides providing economic benefits such as reducing missed deliveries and providing more flexibility mentioned above, it allows the sharing of location and real time tracking (Table 7 point 4) to take place (see Section 5.4.4.3). It is particularly important in handling problems with cultural interactions (Table 7 point 6), such as male–female interactions (see Section 5.5.4.2). However, it can sometimes lead to privacy concerns as noted in Section 5.5.4.2.

As noted by point 3 in Table 7, the voluntary character of the drivers' participation is socially beneficial. This benefit also applies to the implementations investigated in Saudi Arabia.

*Environmental Benefits*

Although environmental issues were raised in the semi-structured interviews, they were not seen as a primary driver for CLD by the stakeholder groups. The environmental benefits in Table 6 and Table 7 principally stem from reducing the number of delivery miles travelled. The main way to do this is to make use of existing journeys where there is unused capacity—the benefits are generally far less when the journeys were not already planned (Sampaio and Sampaio, 2015). However, this seems more applicable to longer distance journeys than for LMD in urban areas.

Some traffic reduction can be achieved by the mechanism for allocating drivers to jobs, and by the design of the revenue model (see Table 13).

# Chapter 7: Conclusion

## *7.1 Introduction:*

This chapter concludes this thesis, summarising the findings presented in chapter 6, re-evaluating how the research questions and research objectives were answered, as well as highlighting the contributions of this study to the literature and practice of logistics and supply chain management.

## *7.2 Thesis summary:*

Crowd Logistics Delivery (CLD) is a frontier in logistics systems designed to enable people to link and coordinate the delivery of goods along planned travel routes through online platforms. The Kingdom of Saudi Arabia (KSA) is undergoing a huge transition in many ways. In combination with implementation of the KSA's 2030 vision through such as digital transformation and innovation, the increase in people's needs has led to a rapid increase in the use of CLD and consequently the hiring of drivers, by 500% in 2020 alone. The absence of understanding of CLD as an LMD solution and the associated difficulties this solution faces which can determine its success or failure was the main driver for conducting this study in the KSA context. Moreover, the significance of last mile delivery (LMD) has been emphasised in the literature of both logistics and supply chain management as a vital part of the delivery chain. However, there are several negative effects from LMD that can have an impact on the last mile logistics and supply chain management. The systematic literature review (SLR) in chapter 2 identified the challenges and negative impacts that LMD faces, with implications including accidents, infrastructure issues, air and land pollution, and congestion. Consequently, different solutions have been proposed and implemented for LMD. One of those solutions is CLD. The SLR indicated that to date there are limited studies in the last mile logistics field in general. Furthermore, until recently there has been little interest in CLD research. Specifically, in an emerging economy context, different factors can have a significant influence, such as the logistics infrastructure, the nature of society, and the values deriving from culture and norms. Moreover, a high number of published studies have employed only secondary data and quantitative methods. In addition, while several studies have explored the topic of CLD, their investigation has been limited to the perspectives of one or two stakeholders. Thus, a more comprehensive study that included the perspectives of more groups of stakeholders was required to have a more complete understanding of this emerging phenomenon of CLD.

Therefore, in the selected research context, this study answers the why and how questions that other studies failed to answer.

### *7.2.1 Research questions and answers*

This section presents the answers to each of the research questions in this study. This thesis has answered three research questions and met seven objectives. The answers to each research question are briefly summarised below.

**RQ1**: How is crowd logistics delivery (CLD) implemented in the context of the Kingdom of Saudi Arabia?

RO1: To identify the CLD business models

RO2: To identify the stakeholders engaged in different CLD business models

RO3: To explore the limitations of the CLD business models from the perspectives of different stakeholders

RO4: To explore how CLD business models create value for their drivers, thereby making them attractive for use as an LMD solution

Understanding the business models is significant to understanding the rest of this study's findings because different practices of CLD are currently in use, and the other questions will refer to the different practices and names identified in answering RQ1. Thus, knowing the current implementations of CLD in the context will lead to understanding of the concepts discussed in relation to the other questions. The findings of this research question show there are three different business models: B-to-B-Contract, B-to-C, and C-to-C. This finding broadly supports the work of other studies in this area. However, different implementations of CLD are used in the context of the Kingdom of Saudi Arabia (KSA) compared to those described in the literature, which solve LMD issues for a variety of stakeholders, particularly in the case of the C-to-C business model. The internal success factors of each business model were also identified in relation to registration, orders assigning, compensation, and payment model.

Having identified that implementation of CLD in the context of the KSA is represented by the business models B-to-B-Contract, B-to-C and C-to-C, four main differences in these business models were observed, relating to the definition, product flow path, registrations, money generation, and the relevant stakeholders. Although the business models corresponded with those in some other studies in terms of their typology, the *implementations* differ in relation to the context where the study took place. Regarding the different models, B-to-B-Contract has

been identified as products moving from business to business, whereas in this study it is defined according to the application owners' perspectives, based on payment models. Although the movement of products is between business and customers, the customer is not involved in the agreement or payment to the CLD application. Additionally, the implementation of the C-to-C business model in relation to the stakeholders differs in this study compared to other studies. Some of the mentioned studies previously highlighted that C-to-C matches two individuals, one being the sender who sends the package, and the other one being the traveller who executes the task. However, in this study the sender is not necessarily involved, as the receiver may request from an individual or from a business. Thus, a few differences in the business model implementations were identified in this study, especially in the B-to-B-Contract and C-to-C.

Regarding categorisation of crowd logistics services, another study (Frehe et al., 2017) identified three types: delivery services, personal transport, and freight transport and purchase; however, within the scope of this study, the purchase and delivery service is a combination of food shopping, delivery, and e-commerce. Although the naming in the B-to-B model is the same, the relevant stakeholders are different. B-to-B in the current study context acts as third-party logistics (3PL) for LSPs or to deliver to customers who order from e-commerce companies. Also, the name for B-to-B-Contract used in this research to distinguish it from other B-to-B models in the literature. This is in contrast to C-to-C which is from anywhere to anyone. In other words, the customer could be a business or individual and also can be a sender or receiver. Another main difference in C-to-C as an LMD is that the customer can customise his/her orders from different places. Although some studies briefly identify some business models, they do not explain the details of the implementation of the business models.

In addressing the second objective, this study involves more stakeholders than other studies, particularly individual and institutional stakeholders. The findings depict that the stakeholders are different from one business model to another in the context of CLD. The study differentiated among stakeholders in the different business models in terms of their relevance and saliency. While a stakeholder may be definitive and salient to one business model, they might be discretionary and lack salience in another business model. Therefore, the study also contributes by distinguishing between salient and discretionary stakeholders.

Furthermore, the findings on RO3 identified three limitations regarding the different business models: market limitation, stakeholders' relationship complexity, and single source of income.

Additionally, in addressing RO4 it was revealed that there are four internal factors that make a business model more attractive to the drivers, and which, if met, contribute to its success and sustainability, namely ease of registration, orders assigning, payment models, and compensations.

*RQ1 findings and contributions summary:*

- It identified the direct stakeholders in each business model and their saliency to the business model, which resulted in some stakeholders being of high salience to one business model but low in another.

- It provided empirical evidence of implementation based on the identified stakeholders' perspectives.

- It showed how different CLD applications may fail even within the same business model. An example in (B1) and (B2) was caused by lack of efficiency in signing up the drivers. It also showed how assigning orders for drivers based on location is more efficient and better than self-checking.

- It demonstrated how internal factors, such as registrations and assigning drivers, differ from one application to another. Also, it showed how stakeholders are affected by those factors and hence the impact on the business model.

- It showed how each stakeholder is affected by those factors and hence the impact on the business model.

- It identified how different payment models can affect the crowd participation. For example, in the bidding-based model, the money is generated from drivers not retailers or customers. Hence, the payment model here affects the crowd participation in this business model more than other business models.

- It identified not only what factors lead to crowd participation in CLD but also why these factors are drivers for participating. For example, the gas price and VAT played a role in making the distance-based model more satisfying for drivers than the fixed-price model.

- It found that the drivers in the applications that pay low rates are motivated to work for two reasons. First, they may prefer destinations close to their neighbourhood area; second, if the address on the parcel is on the drivers' route, it will be more convenient for the driver.

- It was found that C-to-C allows the individual stakeholder more opportunity to have LMD service than the B-to-C model. The B-to-C model relies on location in assigning drivers for customers, while C-to-C relies on bidding offers for assigning drivers

- The bidding-based model was preferred as it achieves the best possible price. Drivers take into consideration time, quantity, and distance when setting the price.

- High numbers of drivers led to low prices being offered by drivers to the customers.

- Negotiating was another factor that motivated customers and drivers to use the bidding-based model. The opportunity to offer a delivery price and negotiate was seen as a positive. This issue consisted of two parts: the first relating to cash on delivery rather than online payment and the second to the amount limit restriction.

- It was found that non-monetary- motivated drivers impact the price rate offered by other drivers, which impact the drivers' participation

**RQ2**: Why do the stakeholders in different business models use CLD as a LMD solution?

RO5: To explore how potential synergised values among different stakeholders lead to the use of CLD as a LMD solution

RO6: To explore in what ways the stakeholders are motivated towards using CLD as a sustainable LMD solution

RO5 showed that LMD-related benefits are the main motive to use CLD as an LMD solution, with the address issue playing a significant role. The address issue is a problem to a greater or lesser extent for all of the stakeholders. The data revealed that the delivery address is a major issue faced by stakeholders in the last mile field. This issue enhanced the value of CLD for the interviewees and consequently emphasises the importance of CLD. This explains why a large number of parcels are sent back to the shipper with a label on them saying that the location was not found, even in urban and affluent areas. This problem originates from issues in the address infrastructure.

Interviewees highlighted that the main issues related to the address are caused by different factors affecting stakeholders at an individual, institutional, or industry level. Besides, various stakeholder factors contribute to address problems relating to such as the complexity of the address, language barriers leading to spelling and communication issues, customer and driver awareness of using the delivery address, and e-commerce companies' websites. Hence, these issues caused several problems in terms of last-mile delivery. Some of these problems led to increased communication cost, inefficiency, delay, and returned items.
The interviews also showed that the address issues can clearly be linked to lack of stakeholder engagement.
In rural areas, the awareness and usage of addresses is even lower. In these areas, LSPs drop off the items in their offices, then call/text customers to pick them up. For urban and rural cases, therefore, the address matter leads to inefficiency, and that harms the last-mile process. When the last mile is performed efficiently, retailers are rewarded with savings and buyers experience a convenient transaction. Thus, LMD-related benefits that include solution to address issues, speed of delivery, drop-off flexibility, and real-time tracking are the main motivations for individual stakeholders to use CLD. CLD can overcome the address complications that result in privacy issues and inefficiency.

Location sharing and real-time tracking features in CLD applications provide stakeholders with LMD that offers more transparency. In terms of knowing the pick-up time and leading time, which increases customer loyalty and trust in CLD over the LSPs. In addition, these features benefit people in rural areas and give them more access to markets. Even though the address issue still exists, the problem has been dramatically reduced.

In terms of speed of delivery, the larger number of drivers employed by CLD compared to the traditional logistics services providers. Therefore, the CLD has the advantage of having one driver for a few or each of the customer orders The data has shown that the speed of delivery in all CLD business models is valuable to all stakeholders. The higher number of drivers in CLD than in traditional delivery models gives them the advantage of ensuring faster delivery. In relation to drop-off flexibility, it prevents repeated delivery attempts in the case of an unattended home, which contributes both economic and environmental values for drivers and saves customers time, as they no longer have to pick up their items from the office or any other pick-up point.

The study found that all CLD business models provide stakeholders with LMD benefits; hence CLD has become a favourable LMD solution for all stakeholders.

The impact of CLD on society is another main motive to use CLD. With regard to this impact, individual stakeholders (customers) use CLD because it benefits the community, provides a source of income, and offers work flexibility, lower cost, and accessibility. Drivers, meanwhile, use it for monetary and non-monetary reasons, as external factors. However, RO6 findings revealed that there is a lack of motivation on the part of all stakeholders to adopt environmentally sustainable solutions/options, which impacts on the overall solution. This finding is contrary to previous studies in western contexts that have mentioned environmental sustainability as one of the main motivations to use CLD. The individuals (customers and drivers) that were interviewed neither showed interest in nor saw the value of sustainability, and clearly were not motivated by sustainability. In terms of other stakeholder groups, there were some misunderstandings of the concept of sustainability, and this was clarified by the researcher throughout the interviews. Only the industrial and institutional perspectives on these dimensions were taken.

It then showed how CLD contributes to society through hiring, social development, and training. In practice, although the social dimension is not a motive, the CLD provides social benefits to the community through the industrial stakeholders. However, the industrial stakeholders' lack of interest in the social dimension will negatively impact CLD's sustainability and that of LMD industry in general. The study showed that none of the stakeholders interviewed mentioned any environmental values, and so this did not play a role in motivating use of CLD as an LMD solution. In other words, the use of CLD by stakeholders is driven by the potential economic and social benefits and not by environmental drivers such as traffic and resource usage, and use of land. While interviewees, particularly industrial and institutional stakeholders, are aware of these benefits and show appreciation for them, they are not motivations to adopt CLD. Consequently, both industrial and institutional stakeholders lack the motivation to innovate and apply more environmentally friendly solutions, such as choice of mode, which is one of the factors for sustainability.

As a conclusion, this study claims that meeting internal and external stakeholder interests leads to CLD success.

**RQ3**: What challenges do stakeholders face in the successful and sustainable adoption of CLD?

RO7: To explore the current and potential challenges different stakeholders' groups face that prevent the development of CLD as a LMD solution

The study, in meeting RO7, identified mutual barriers and threats to CLD as an LMD solution from a variety of stakeholders. Specifically, legislation, availability of supply/drivers, trust, and culture are the main threats for CLD as an LMD solution. Addressing these threats requires engaging all stakeholders, and finding interception points as mutual benefits that will satisfy all stakeholders or incur the least trade-off cost. In terms of legislation, Industrial stakeholders in this study highlighted two problems that occur because of legislation issues. First, requirements such as a prerequisite to have a delivery licence make the implementation more difficult. Second, unequal competition occurs among LSPs and CLD business models. On the other hand, the institutional stakeholders consider the legal issues in two different ways. First, the fast growth of CLD makes it difficult to regulate and to introduce new policies before the industry takes another step forward. The procedure of legalising such laws is also delayed by the requirement for them to be approved by different ministries. Second, the huge demand that has encouraged illegal practices in the market has led to security issues. Regarding the availability of supply/drivers, the study showed that the crowd is a definitive stakeholder in all CLD business models. Besides, it is obvious that new supply (crowd/drivers) is constantly needed for CLD, which differs from the traditional delivery situation, where drivers are full-time employees and on the payroll of an LSP. Hence, drivers need to be available whenever appropriate (assuming proper planning processes). In a CLD situation where drivers often engage in the market on a voluntary basis, CLD providers must take into account their availability and preparedness for work.

The findings show that there is a need to involve decision makers, drivers, and customers as main stakeholders to overcome these challenges. The institutional stakeholders play a large role to facilitate the involvement of supply (crowd) to the industry in terms of regulations and requirements. Industrial stakeholders highlighted the challenges they faced to acquire the supply/drivers due to some of the regulations. Industrial stakeholders, on the other hand, also require the involvement of individual stakeholders (both customers and drivers) in order to know what makes a business model or application more attractive, such as the payment model or compensation, as has been revealed in the study. Hence, all stakeholders play a role in overcoming this challenge of CLD as an LMD solution. In relation to trust, this study revealed

that trust is seen differently by the various stakeholders. The main reason trust is an issue is that the LMD task is implemented by the crowd. Trust in individual stakeholders, customers specifically, is seen as compliance with delivery time, and as relating to damage and loss, and honesty. This study found that drivers see trust as depending on honesty on the part of customers in giving fair rating and reviews of their service, because this impacts on drivers' work reputation and therefore drivers' income and future work. Only one driver mentioned concerns about illegal items. On the other hand, the industrial stakeholders see trust as affected by damage, loss, and the stealing of items. Businesses are now implementing procedures to ensure that their services build customer confidence and security, such as through training and follow-up in the case of (B1) and the rating system in the other models identified in the study. Carrying out background checks on drivers is another procedure implemented by other CLD businesses (e.g. UberRUSH and Deliv), although this was not revealed to be a practice in our study. However, application owners highlighted the level of trust as being lower compared to the previous year. Finally, regarding the culture, the study revealed how stakeholders perceive the influence of culture and how meeting cultural norms provides stakeholders with value and a better chance of success. It shows how cultural awareness can be used to gain competitive advantage, by application owners developing and implementing strategies to overcome last mile delivery issues. This study revealed three cultural factors that could affect CLD, namely privacy, handling, and trust in payment. The study revealed that culture influences perspectives of privacy in CLD and the LMD field. Specifically, if culture is not considered in the communication and interaction of drivers and customers, it may be a barrier for CLD growth. Lack of formal contact between suppliers of logistics services and the customers (individual customers) of their customers (retailers) leads to a lack of information about the delivery service (date, time, location) which can affect its success. While CLD implementations by their nature allow a certain level of communication between drivers and customers, this is seen as a challenge by both customers and drivers. In addition, this study found that customers have concerns about the sharing of their personal information, home addresses and purchase habits. Another factor is handling of the delivery, which creates cultural challenges caused by the interaction between opposite genders that consequently can make delivery inefficient. It may also cause increased environmental impact due to higher fuel use and emissions, increased economic impact as drivers may not be able to take other orders, which reduces their income, and the social impact of embarrassment to drivers or customers. This shows that the handling of culture needs to be considered for successful CLD. In terms of trust, in this study it is related to cultural practices. For example, the study showed there were trust concerns from the drivers

and customers over online payment systems. Cash on delivery is the preferred payment method among customers, which may increase the inefficiency of the last mile process. The study hence shows that adapting CLD towards the respective culture in which the service is implemented will increase its value to stakeholders and enhance overall success and sustainability of the CLD service. Conversely, cultural differences may cause barriers for CLD implementation depending on the context.

## *7.3 Recommendations:*

### *7.3.1 Industrial stakeholders:*

The application owners in the C-to-C model can create a new feature of not having a maximum limit, which will allow the customers and drivers to have the price that is suitable for both without needing to do any negotiations over the phone which the application cannot control. Gaining more sales is one of the success factors that can be implemented through more control of the transactions. The application owner can improve the bidding-based system by controlling it more effectively in the interests of all the stakeholders. Furthermore, it makes the delivery more efficient by not going saving time and money. In addition to the economic and social impacts, it also harms the environment, as the emissions increase with the number of trips and distance. Therefore, to remove this potential barrier in the bidding-based system, lifting the limitation of the amount required per order should be considered in order to improve the charging model. This will result in increased satisfaction for the drivers and customers. Moreover, it will improve the efficiency of delivery by not wasting the drivers' time, fuel, and energy, and will avoid increasing the customers' waiting time. This disadvantage can negatively affect the model's success over the longer term. due to the limited markets, the key is to forge more contracts in different industries. In terms of expanding, the B-to-B model, due to the limited markets, the key is to forge more contracts in different industries. The C-to-C model also can avoid the internal factor barrier of having a source of income from a single stakeholder group is to expand by contracting with retailers, thereby gaining more sources of income while keeping the current model running. That may maximise the shareholder value from an economic sustainability aspect.

The drivers highlighted that ease of registration encourages them to move to other business models and applications. Hence the drivers see the complexity of the process as a barrier compared to other applications (business models) that pay almost the same with less restriction. Therefore, if the application owners want to improve the quality and safety while keeping the

drivers, they need to overcome this barrier by paying the drivers more than other applications and business models

The payment model in the business model implementation plays a large role in making the CLD application successful. Although each payment system has its strengths and weaknesses, improving the payment model contributes to the overall success of the business model application. In the case of the bidding-based model, customers enjoy having an opportunity to negotiate, and drivers like the feature of raising and lowering the price based on time, distance, and demand. Hence, there is a perception among both customers and drivers that this is the best model for them. However, as a drawback, application owners often lose out because they are unable to control the process. In addition, with the bidding model of charging, limitations arise when it comes to the collection of payments. Therefore, considerable improvements are needed in order to keep and attract more drivers and be successful, such as increasing the amount to be paid by customers. On the other hand, the distance-based model is the best for drivers in terms of covering the travelling distance cost. However, as it ignores other factors like the time of day the order is made and the current status of the supply and demand, the price will not be always convenient for drivers and customers, especially if the store is not close by. Simultaneously, the price may not be suitable for customers if the delivery fee is higher than the value of the product delivered. Meanwhile, the bidding system has potential to attract more drivers and customers, as it is not a location-based type of model. However, the current payment and charging models indicate that there is a need for improvement.

Finally, compensation is a major concern for a driver in terms of choosing an application or business model. Inadequate compensation upon cancellation, whether from customers or for any other reasons, leads drivers to lose pay from their own pockets. In other words, a lack of compensation means that drivers work not only for free, but they also lose the trip cost plus the amount they pay to the retailer. In the C-to-C model compensation is scarcely applicable for drivers in the way that it is for B-to-C drivers.

When the demand is more than the supply-the drivers, it is hard to keep up with demand, and the creation of more initiatives is needed to attract drivers, as some of the application owners mentioned. That requires more investment by shareholders. In addition, it causes delay in delivering the packages, which leads to some customers switching applications. Hence, when demand exceeds supply, drivers tend to increase their delivery prices, especially in a bidding

charging system. That can be a main disadvantage for all business models and for the bidding system specifically and may lead to application failure. Conversely, when the supply – number of applications – exceeds demand, which is not the case with the current findings, that will create a problem in terms of making it more costly to acquire customers rather than drivers. The extra steps that have been taken by the industry to improve the privacy features found acceptance on the customers' side and have resulted in an increase in the number of application users; hence, they have found acceptance among the application owners, which is the main quantifier of success. However, from the drivers' perspective this extra step slows down the delivery process, which affects their income and lowers the number of orders they receive in a day.

While CLD has made a positive contribution in terms of increasing the acceptability of driving as a part time job in the research context, application owners should take into account the privacy and trust concerns of drivers and customers to ensure CL sustainability. Finally, increasing awareness and understanding of online CLD payment options could enhance the efficiency of CLD in the emerging economy context.

*7.3.2 Institutional stakeholders:*

The fact that the fast growth of CLD lead to have more complaints and issues for all stakeholders. Thus, the legislator should act faster than before as the high-level decision maker mentioned. Thus, the legislation needs to keep up with the rapid pace of market growth. In addition, the competition may be unequal if there are some applications that do not adhere to the rules. The competition between the CLD applications is imbalanced from the application owner's perspective because some CLD applications will follow the new policies while others may ignore them. That gives an advantage to those applications that do not adhere with policies; for example, one of the advantages is the reduction in labour costs.

In addition, government policies may need to be created and implemented to encourage environmentally sustainable CLD solutions. Moreover, the government could consider incentives for the crowd to make CLD applications more sustainable and to improve employment rates, such as simplification of registration. Furthermore, the users right should be protected by creating policies for companies to adhere. For instance, drivers face compensation issues that lead them to pay from their pocket. Thus, it is recommended to create policies for CLD companies to compensate the drivers and any failure occurs that the drivers irresponsible for.

### *7.3.3 Individual stakeholders:*

The individual stakeholders revealed main issues, which can be solved by them as drivers and customers. There are three recommendations for individual stakeholders. First, the awareness of individuals should increase to overcome address issues, online payment, and privacy. Second, safety, the data revealed that only one driver is aware of illegal substance that can be sent through the delivery task assigned. Therefore, the drivers should pay more attention to that and avoid unknow parcels, pick-up, drop-off location. Finally, to increase the participation trust is the main barrier in both institutional and industrial stakeholders. Therefore, increasing the delivery rate and honesty play a significant role in increasing the drivers' income and more journeys assignments.

### *7.3.4 Recommendation all stakeholders in lens of stakeholders theory*

There is a lack of engagement of stakeholders in order to improve LMD issues in general. Thus, there is an urgent need for involving all stakeholders in collaboration: Industrial, Institutional, and Individual, to solve the address issue, as it is a major issue in the LMD context. The address issue does not only cause economic issues, it also creates social and environmental issues.

Various stakeholders play a large role in causing the address issue. Those issues are represented by the conflict in various stakeholders' interests, such as e-commerce companies not wanting to lose customers' purchases and allowing customers to enter any random address. This is a big challenge since a large volume of loads come to the LSPs and CLD from e-commerce alone. Also, LSP companies need to work with institutional stakeholders to improve the address infrastructure instead of relying on communication with individuals, which causes inefficiency and social issues. Individual awareness needs to be increased by fixing problems that include but are not limited to language barriers.

## *7.4 Contribution*

### *7.4.1 Theoretical contribution:*

The central aim of the research was to obtain a comprehensive understanding of CLD as an LMD solution. The study provides a comprehensive insight into a new and overlooked phenomenon. In the current supply chain literature, the role played by customers and crowds in supply chain processes as active participants has been neglected. Therefore, in practice, phenomena including crowdsourcing, co-production and cocreation have not been discussed

sufficiently. There is also a lack of insights into the emerging crowdsourcing business models in general and CLD business models specifically, and their possible effects on various supply chain participants, particularly in relation to emerging economies. This thesis therefore addresses these gaps in the literature by exploring the use of CLD as a LMD solution from the perspectives of different stakeholders. Hence, it provides a comprehensive insight into this emerging phenomenon in a previously underexplored context.

The study extends the theory in context of CLD. It applies stakeholder theory to analysis of an emerging phenomenon in answering its research questions. The literature revealed that there is a bias towards industrial perspectives and lack of involvement of different stakeholders' perspectives. Thus, this study contributes by involving more stakeholders who are involved in the implementation of CLD, including individual and institutional stakeholders. In addition, it articulates similarities and differences between the ad hoc mechanisms for using CLD in general and its business models as an LMD solution. Moreover, this study provides insights into CLD problems that cannot be met by traditional delivery models, and further contributes to the current literature of physical distribution service and logistics by identifying certain factors that are not applicable to or necessarily relevant to traditional delivery services but can play an essential role in the context of CLD. These factors include the role of culture in privacy issues and delivery handling and the influence of delivery time adherence on trust. These can also be identified as new constructs that threaten the development of CLD. Furthermore, the application of stakeholder theory resulted in different categories of outputs. Hence, the study identified the relevant stakeholders for each business model of CLD and highlighted their conflicting perspectives and the homogenous interests that impact on its success.

Therefore, this research has added to the literature by providing a comprehensive understanding of an emerging solution to the issues in last mile deliveries. It confirmed and expanded the current knowledge on the challenges and solutions in CLD and LMD context, and it analysed stakeholders' preferences and the most important characteristics of CLD as a LMD solution. Lastly, it offered an analysis from the unique perspectives of stakeholders, including *institutional*: decision makers, *industrial*: CLD applications owners, LSPs' managers, and retailers' owners, and *individual*: customers and drivers/crowd, and in the context of an emerging economy of KSA, where contextual factors might lead to different conclusions from those drawn by studies conducted in a western context.

To conclude, the stakeholder theory extended to deeply understand the phenomenon more. It contributes to understanding the affected stakeholders based on their interests and saliency, the conflict between different stakeholders, the advantages and disadvantages of certain practices of CLD on stakeholders, which contribute s to its success. Crowd was included in this study as its participation is the lifeblood of CLD, and without knowing its perspectives, CLD cannot be successful. Indeed, customers' dissatisfaction may be one of the main reasons for failure of applications. The saliency of stakeholders helps us to know what stakeholders we should keep close eye on and try to answer their calls and claims. Stakeholder theory also helped to understand different perspectives of some factors and show that there are different understandings of terms and factors, such as trust and security. Finally, analysis based on stakeholder theory enabled the met and unmet interests to be identified in answering the research questions.

### *7.4.2 Theory reflection and results:*

The study shows that CLD as a solution meets some stakeholder claims, especially in the LMD context, and the business models neglect some other claims. This results how to the researcher draw the conclusion based on the theory. The CLD stakeholders belonged to one of the three stakeholder groups: institutional, industrial, and individuals. Those groups varied in terms of their saliency in the business models, and so their claims also differed from one to another. The interviews reveal that the interests and perspectives of stakeholders are in some respects homogeneous and in others not. the study shows that CLD as a solution meets some stakeholder claims, especially in the LMD context, and the business models neglect some other claims. Therefore, A CLD business model could succeed if it creates urgency for stakeholders' claims and reduces the threat to the main claims.

Furthermore, the stakeholder theory showed how some of main issues discussed in the literature are not vital issues in this study. For instance, the environmental issues are not a concern for any stakeholders' groups, unlike what literature showed that some countries and individuals adopted CLD solution for environmental and sustainability reasons. The theory also helped to show that some business models of CLD are implemented differently from country to another e.g., B-to-B-Contract business model.

On the other hand, the stakeholder theory helps to draw the recommendations sections that gives recommendations for each stakeholders' group and recommendation that would improve the CLD as LMD solution.

### *7.4.3 Methodological contribution:*

An inductive approach was appropriate to conduct such a research considering that this was an exploratory study. The relevance of methodological thoroughness in management research is emphasised in chapter 4. The outcomes validate the adoption of an inductive approach to analyse the research issue using qualitative strategies. This research has empirically investigated a crowd logistics associated study from multi-stakeholders' perspectives using the inductive approach. The results indicate that it is a useful paradigm to support future research in this field. The strength of using inductive case study as a methodological approach is that it allowed this study to gain more knowledge about the field by exploring and revealing factors in relation to stakeholders that would otherwise have been hard to uncover.

### *7.4.4 Practical contributions:*

This research provides several practical contributions in the CLD and LMD field based on primary data that will enrich the context. First, the empirical study has considered the perspectives of stakeholders in CLD and explored issues related to implementation, motivations, policy, trust, security, culture, and other industry implications for CLD. This study could be informative for companies struggling to understand stakeholders' expectations and help them to develop stakeholders-centred CLD services. For instance, the research found that privacy and cultural issues were overlooked factors that are obstacles to CLD participation. Additionally, the behavioural insights gained from the interviewees regarding CLD business models will help to improve those business models.

In this study, the answers in relation to the business models identified a number of different practices. It was also found that once business models are well-established based on different stakeholders' interests and needs, they could become best practices. To provide recommendations for the long-term implementation of CLD, this study has identified internal and external factors which influence the success of companies engaged in CLD.

Internal factors that increase CLD participation within the business models; also see Figure 36*:*

a) Ease of registration
b) Orders assigning

c) Payment model

d) Compensation

Internal factors limiting success of a business model:

e) Market limitation

f) Stakeholders' relationship complexity

g) Single source of income

And external factors affecting CLD as a whole:

h) Legislation

i) Supply and demand

j) Trust

k) Culture

l) Environmental motivations

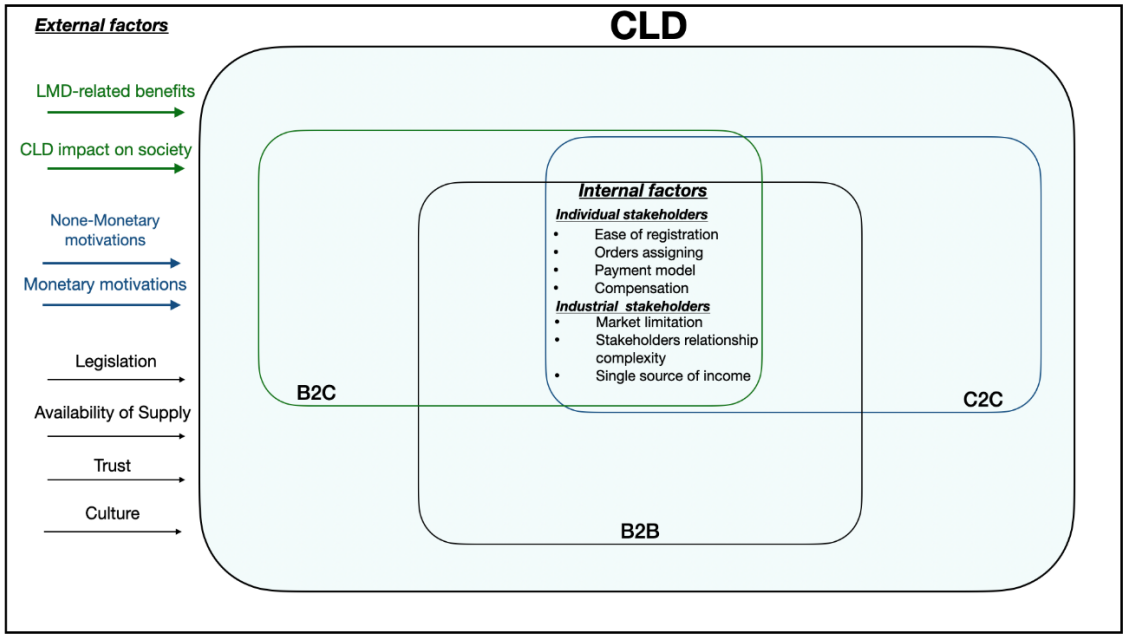


*Figure 36 Summary of the final findings*

In addition, CLD companies' success relies mainly on the individual stakeholders. Therefore, enhancing the LMD-benefits and the social impact on the community will contribute to companies' success and sustainability.

As a whole, this research established critical elements for creating acceptable and stakeholders-focussed solutions to address issues relevant to LMD through CLD.

### *7.4.5 Research limitations*

As discussed in the preceding sections, the findings of this research have made valuable contributions to literature and practice, which could also be generalised to other Gulf Countries and other contexts that share similar contextual characteristics. However, there are some drawbacks that need discussion. The number of cases and interviews included in the study, as well as time and contextual constraints may have constituted limitations. Conducting more interviews with more participants could have allowed deeper understanding and added more factors to consider in the field of CLD. This research, for example, has not explicitly investigated or calculated CLD performance efficiency as an LMD solution.

This research has focussed on the specifics of crowd logistics delivery industry in relation to a developing economy. In so doing, it only looked at goods delivery inside the city. It would be useful to study freight, warehousing, and other crowdsourcing industries that have not been explored in this study.

### *7.4.6 Direction for future studies*

As an exploratory research, this study opens up new areas for future studies within CLD. First, to confirm or add to the findings of this study in similar contexts. Moreover, further investigations are necessary to further explore the current findings in other emerging countries and draw comparisons with developed countries. Such studies will help to provide more business models for implementation of CLD and evaluate key factors within the environments where there are different drivers and barriers for stakeholders' use of CLD as an LMD. In addition, the study should be repeated in rural settings to address the differences in trust, culture, and quality. Methodologically, although the use of inductive approach has strengthened the replicability and rigour of this analysis, there is still opportunity for further research to establish hypothetical frameworks for quantitative testing of the results of this study. A mixed methods approach will improve the robustness of potential inquiries in this sense and increase methodological integration in this discipline. Furthermore, more investigation of stakeholders' environmental sustainability motivations is vital, to encourage learning on how the crowdsourcing concept can influence stakeholders to use resources efficiently and sustainably. Also, more understanding is required of trust and privacy in terms of their definitions and their impact on CLD.

Finally, as this topic is evolving so rapidly, considerably more work will need to be done on crowd logistics in general and CLD specifically. For instance, the impact of internal and external factors of business models on the development of different uses of crowd logistics and CLD requires further study. Greater understanding is urgently needed in all these areas of this emerging topic.

## *7.5 Thesis Summary*

This study determined the CLD business models for LMD being used in Saudi Arabia, and investigated the benefits that these models provided to their various stakeholders in terms of 3BL sustainability. Three models were discovered—B-to-B-Contract, B-to-C , and C-to-C. The motivations for using these models were economic and social. There was little environmental pressure. The economic factors fell broadly into the categories that had been reported in the literature and summarized in Tables 1 and 2. However, there was a significant overlap between the economic factors and the more social aspects driven by the country's cultural background. For example, the high degree of communication between the drivers and the customers ameliorated issues such as the address problems and male–female interactions.

CLD for LMD faces different challenges in rapidly emerging economies than it does in developed countries. There have been very few studies that have focused on CLD for LMD in emerging economies, and so this study helps to address this gap. While their rapid growth means that there will be similarities between emerging economies, each one will have its own special features. Hence it can be expected that Saudi Arabia's CLD models experience similar issues to those in other Gulf states, and there is likely to be more divergence from the models suitable for emerging economies in South and Central America and Asia. Consequently, it would be valuable for similar studies to be carried out in emerging economies in other regions.

The exploratory nature of the study meant that it was carried out by interviewing 39 stakeholders who were identified by snowballing. Therefore, a large-scale quantitative survey is desirable to provide confirmation of the findings, for example with regard to the stakeholder evaluations of the 3BL benefits that CLD provides.

# References


AGATZ, N., CAMPBELL, A., FLEISCHMANN, M. & SAVELSBERGH, M. 2011. Time slot management in attended home delivery. *Transportation Science,* 45**,** 435-449.

AHMADI, M., SEIFI, A. & TOOTOONI, B. 2015. A humanitarian logistics model for disaster relief operation considering network failure and standard relief time: A case study on San Francisco district. *Transportation Research Part E: Logistics and Transportation Review,* 75**,** 145-163.

AL-DEBEI, M. M. & AVISON, D. 2010. Developing a unified framework of the business model concept. *European Journal of Information Systems,* 19**,** 359-376.

ALAN BRYMAN, E. B. 2011. *Business Research Methods,* United States, Oxford University Press Inc.

ALFURAIH, S. E-commerce and e-commerce fraud in Saudi Arabia: A case study. 2008 International Conference on Information Security and Assurance (isa 2008), 2008. IEEE, 176-180.

ALGHAMDI, R., DREW, S. & AL-GHAITH, W. 2011. Factors Influencing e-commerce Adoption by Retailers in Saudi Arabia: a qualitative analysis. *The Electronic Journal of Information Systems in Developing Countries,* 47**,** 1-23.

ALHARBI, A., CANTARELLI, C. & BRINT, A. 2022. Crowd Models for Last Mile Delivery in an Emerging Economy. *Sustainability,* 14**,** 1401.

ALLEE, V. 2011. Value Networks and the true nature of collaboration, Online edn. *Value Net Works and Verna Allee Associates*.

ALLEN, J., PIECYK, M. & PIOTROWSKA, M. 2017. Analysis of online shopping and home delivery in the UK.

ANAND, N., YANG, M., VAN DUIN, J. R. & TAVASSZY, L. 2012. GenCLOn: An ontology for city logistics. *Expert Systems with Applications,* 39**,** 11944-11960.

ANTIKAINEN, M., MÄKIPÄÄ, M. & AHONEN, M. 2010. Motivating and supporting collaboration in open innovation. *European Journal of Innovation Management*.

ARCHETTI, C., SAVELSBERGH, M. & SPERANZA, M. G. 2016. The Vehicle Routing Problem with Occasional Drivers. *European Journal of Operational Research,* 254**,** 472-480.

AREND, R. J. 2013. The business model: Present and future—beyond a skeumorph. *Strategic Organization,* 11**,** 390-402.

ARSLAN, A. M., AGATZ, N., KROON, L. & ZUIDWIJK, R. 2019. Crowdsourced delivery—A dynamic pickup and delivery problem with ad hoc drivers. *Transportation Science,* 53**,** 222-235.

ARVIDSSON, N., GIVONI, M. & WOXENIUS, J. 2016. Exploring last mile synergies in passenger and freight transport. *Built Environment,* 42**,** 523-538.

ASHBY, A., LEAT, M. & HUDSON-SMITH, M. 2012. Making connections: a review of supply chain management and sustainability literature. *Supply Chain Management: An International Journal,* 17**,** 497-516.

ASMUSSEN, K. J. & CRESWELL, J. W. 1995. Campus response to a student gunman. *The Journal of Higher Education,* 66**,** 575-591.

BAHADDAD, A. A., ALGHAMDI, R. & ALKHALAF, S. 2015. Adoption factors for e-malls in the SME sector in Saudi Arabia. *arXiv preprint arXiv:1504.01112*.

BALLANTYNE, E. E., LINDHOLM, M. & WHITEING, A. 2013. A comparative study of urban freight transport planning: addressing stakeholder needs. *Journal of transport geography,* 32**,** 93-101.

BARKI, E. & PARENTE, J. 2014. Challenges and opportunities of the last mile for the base of the pyramid: The case of Brazil. *Field Actions Science Report,* 2014.
BATTINI, D., PERETTI, U., PERSONA, A. & SGARBOSSA, F. 2014. Application of humanitarian last mile distribution model. *Journal of Humanitarian Logistics and Supply Chain Management,* 4**,** 131-148.
BAXTER, P. & JACK, S. 2008. Qualitative case study methodology: Study design and implementation for novice researchers. *The qualitative report,* 13**,** 544-559.
BAYUS, B. L. 2013. Crowdsourcing new product ideas over time: An analysis of the Dell IdeaStorm community. *Management science,* 59**,** 226-244.
BEHRENDS, S., LINDHOLM, M. & WOXENIUS, J. 2008. The impact of urban freight transport: A definition of sustainability from an actor's perspective. *Transportation planning and technology,* 31**,** 693-713.
BELL, E., BRYMAN, A. & HARLEY, B. 2018. *Business research methods*, Oxford university press.
BENTON-KUPPER, J. 1999. Teaching in the block: Perceptions from within. *The High School Journal,* 83**,** 26-34.
BHATTACHARJYA, J., ELLISON, A. & TRIPATHI, S. 2016. An exploration of logistics-related customer service provision on Twitter: The case of e-retailers. *International Journal of Physical Distribution and Logistics Management,* 46**,** 659-680.
BLANCO, E. & FRANSOO, J. 2013. Reaching 50 million nanostores: Retail distribution in emerging megacities. *Technische Universiteit Eindhoven: Eindhoven, The Netherlands*.
BOCKEN, N., SHORT, S., RANA, P. & EVANS, S. 2013. A value mapping tool for sustainable business modelling. *Corporate Governance,* 13**,** 482-497.
BOCKEN, N. M. P., RANA, P. & SHORT, S. W. 2015. Value mapping for sustainable business thinking. *Journal of Industrial and Production Engineering,* 32**,** 67-81.
BONOMA, T. V. 1985. Case research in marketing: opportunities, problems, and a process. *Journal of marketing research,* 22**,** 199-208.
BOTSMAN, R. 2014a. Collaborative Logistics. Ripe for Disruption. *Featured Content Perspectives (October). http://www. collaborativeconsumption. com/2014/10/08/collaborativelogistics-ripe-for-disruption*.
BOTSMAN, R. 2014b. Crowdshipping: using the crowd to transform delivery. *AFR Boss Magazine*.
BOUDREAU, K. & LAKHANI, K. 2009. How to manage outside innovation. *MIT Sloan management review,* 50**,** 69.
BOYER, K., BOYER, K. K., FROHLICH, M. T. & HULT, G. T. M. 2005. *Extending the supply chain: How cutting-edge companies bridge the critical last mile into customers' homes*, AMACOM/American Management Association.
BOYER, K. K. & FRÖHLICH, M. T. 2006. Analysis of effects of operational execution on repeat purchasing for heterogeneous customer segments. *Production and Operations Management,* 15**,** 229-242.
BRAUN, V. & CLARKE, V. 2006. Using thematic analysis in psychology. *Qualitative research in psychology,* 3**,** 77-101.
BRUNDTLAND, G. H., KHALID, M., AGNELLI, S., AL-ATHEL, S. & CHIDZERO, B. 1987. Our common future. *New York***,** 8.
BRYANT, S. L., FORTE, A. & BRUCKMAN, A. Becoming Wikipedian: transformation of participation in a collaborative online encyclopedia. Proceedings of the 2005 international ACM SIGGROUP conference on Supporting group work, 2005. 1-10.
BRYMAN, A. 2016. *Social research methods*, Oxford university press.
BRYMAN, A. & BELL, E. 2011. Business research methods. 3 uppl.

BULDEO RAI, H., VERLINDE, S., MERCKX, J. & MACHARIS, C. 2017. Crowd logistics: an opportunity for more sustainable urban freight transport? *European Transport Research Review,* 9.
BULDEO RAI, H., VERLINDE, S., MERCKX, J. & MACHARIS, C. 2018. Can the crowd deliver? Analysis of crowd logistics' types and stakeholder support. *City Logistics 3: Towards Sustainable and Liveable Cities***,** 89-108.
CAIRNS, S. 1996. Delivering alternatives: Successes and failures of home delivery services for food shopping. *Transport Policy,* 3**,** 155-176.
CAIRNS, S. 2005. Delivering supermarket shopping: More or less traffic? *Transport Reviews,* 25**,** 51-84.
CAMPBELL, A. M. & SAVELSBERGH, M. 2006. Incentive schemes for attended home delivery services. *Transportation Science,* 40**,** 327-341.
CAMPBELL, A. M. & SAVELSBERGH, M. W. P. 2005. Decision support for consumer direct grocery initiatives. *Transportation Science,* 39**,** 313-327.
CAO, M. & ZHANG, Q. 2012. Supply chain collaboration: Roles of interorganizational systems, trust, and collaborative culture, Springer Science & Business Media.
CARBONE, V., ROUQUET, A. & ROUSSAT, C. 2017. The Rise of Crowd Logistics: A New Way to Co-Create Logistics Value. Journal of Business Logistics, 38, 238-252.
Chandra, S., Braughton, M., Galicia, L.D., Sanchez, A., Medina, M. and Aldrete, R., 2016. A multi-modal transportation score to evaluate infrastructure supply-demand for commuters. Procedia Engineering, 145, pp.304-311.
CHEN, C., CHENG, S.-F., GUNAWAN, A., MISRA, A., DASGUPTA, K. & CHANDER, D. 2014. TRACCS: Trajectory-aware coordinated urban crowd-sourcing.
CHEN, C. & PAN, S. 2016. Using the crowd of taxis to last mile delivery in e-commerce: A methodological research. *Studies in Computational Intelligence.*
CHEN, C. C. & CHEN, Y. C. 2016. Dynamic programming model for attended delivery time slot management. *Transportation Research Record.*
CHEN, M., WANG, D., SUN, Y., LIU, C. & BAI, Z. 2017a. Service evaluation of public bicycle scheme from a user perspective. *Transportation Research Record.*
CHEN, M. C., CHANG, K. C., HSU, C. L. & YANG, I. C. 2011. Understanding the relationship between service convenience and customer satisfaction in home delivery by Kano model. *Asia Pacific Journal of Marketing and Logistics,* 23**,** 386-410.
CHEN, M. C., HSU, C. L. & LEE, Y. Y. Applying quality function development to develop the home delivery service model for specialty foods in traditional market. 2012 IEEE International Conference on Industrial Engineering and Engineering Management, 2012. IEEE, 1741-1745.
CHEN, Q., CONWAY, A. & CHENG, J. 2017b. Parking for residential delivery in New York City: Regulations and behavior. *Transport Policy,* 54**,** 53-60.
CHEN, W., MES, M. & SCHUTTEN, M. 2018. Multi-hop driver-parcel matching problem with time windows. *Flexible services and manufacturing journal,* 30**,** 517-553.
CHENG, D. 2015. Contestations at the last mile: The corporate-community delivery of water in Manila. *Geoforum,* 59**,** 240-247.
CHESBROUGH, H. 2006. Open Innovation and Open Business Models: A new approach to industrial innovation. *Globalization and open innovation,* 38.
CHESBROUGH, H. 2007. Business model innovation: it's not just about technology anymore. *Strategy & Leadership,* 35**,** 12-17.
CHIU, C. & HONG, Y. 2006. Principles of Social Psychology. *Social psychology of culture. New York, NY, US: Psychology Press*.
CHOU, P. F. & LU, C. S. 2009. Assessing service quality, switching costs and customer loyalty in home-delivery services in Taiwan. *Transport Reviews,* 29**,** 741-758.

CHRISTOPHER, M. I. 2017. *Logistics & supply chain management*.
CHUA, R. Y., ROTH, Y. & LEMOINE, J.-F. 2015. The impact of culture on creativity: How cultural tightness and cultural distance affect global innovation crowdsourcing work. *Administrative Science Quarterly,* 60**,** 189-227.
CITC. 2010. *Communication and Information Technology Commission* [Online]. http://www.citc.gov.sa/citcportal/Homepage/tabid/106/cmspid/%7B611C6EDD-85C5-4800-A0DA-A997A624D0D0%7D/Default.aspx. [Accessed].
CITC.GOV. 2020. Available: https://www.citc.gov.sa/ar/Pages/default.aspx# [Accessed].
CLARKSON, M. E. 1995. A stakeholder framework for analyzing and evaluating corporate social performance. *Academy of management review,* 20**,** 92-117.
CLAUSEN, U., GEIGER, C. & PÖTING, M. Hands-on Testing of Last Mile Concepts. Transportation Research Procedia, 2016. 1533-1542.
COETZER, P. & PASCAREL, N. 2014. Last mile delivery in low income communities: The Sekulula spaza express experiment in South Africa. *Field Actions Science Report,* 2014.
COHEN, B. 2015. Urbanization, City growth, and the New United Nations development agenda. *Cornerstone,* 3**,** 4-7.
COLLIS, J. & HUSSEY, R. 2013. *Business Research: A Practical Guide for Undergraduate and Postgraduate Students,* London, London: Macmillan Education UK.
COLLIS, J. & HUSSEY, R. 2014. Business Research. sl. Palgrave Macmillan.
COMMISSION, C. A. I. T. 2019. *Citc annual report* [Online]. Available: https://www.citc.gov.sa/ar/MediaCenter/Annualreport/Pages/default.aspx [Accessed].
COMMISSION, E. 2014. EU transport in figures. *Statistical pocketbook***,** 46.
CONSTANTIN, J. A. & LUSCH, R. F. 1994. *Understanding resource management: How to deploy your people, products, and processes for maximum productivity*, Irwin Professional Pub.
CORBIN, J. & STRAUSS, A. 2008. Strategies for qualitative data analysis. *Basics of Qualitative Research. Techniques and procedures for developing grounded theory,* 3.
CORBIN, J. M. & STRAUSS, A. 1990. Grounded theory research: Procedures, canons, and evaluative criteria. *Qualitative sociology,* 13**,** 3-21.
COSSU, P. Clean Last Mile Transport and Logistics Management for Smart and Efficient Local Governments in Europe. Transportation Research Procedia, 2016. 1523-1532.
CRESWELL, J. W. 2014. *A concise introduction to mixed methods research*, SAGE publications.
CROTTY, M. 1998. *The foundations of social research: Meaning and perspective in the research process*, Sage.
D'EMIDIO-CASTON, M. & BROWN, J. H. 1998. The other side of the story: Student narratives on the California Drug, Alcohol, and Tobacco Education Programs. *Evaluation review,* 22**,** 95-117.
DABLANC, L. 2007. Goods transport in large European cities: Difficult to organize, difficult to modernize. *Transportation Research Part A: Policy and Practice,* 41**,** 280-285.
DABLANC, L., GIULIANO, G., HOLLIDAY, K. & O'BRIEN, T. 2013. Best practices in urban freight management. *Transportation Research Record.*
DAS, R. & HANAOKA, S. 2014. An agent-based model for resource allocation during relief distribution. *Journal of Humanitarian Logistics and Supply Chain Management,* 4**,** 265-285.
DENZIN, N. K. & LINCOLN, Y. S. 2005. *Introduction: The Discipline and Practice of Qualitative Research,* Thousand Oaks, CA, Sage Publications Ltd.
DETTENBACH, A. M. & UBBER, S. Managing disruptions in last mile distribution. 2015 48th Hawaii International Conference on System Sciences, 2015. IEEE, 1078-1087.

DEVARI, A. 2016. *Crowdsourced Last Mile Delivery Using Social Networks.* Master, The State University of New York at Buffalo.
DOMINGUES, M. L., REIS, V. & MACÁRIO, R. A comprehensive framework for measuring performance in a third-party logistics provider. Transportation Research Procedia, 2015. 662-672.
DONALDSON, T. & PRESTON, L. E. 1995. The stakeholder theory of the corporation: Concepts, evidence, and implications. *Academy of management Review,* 20**,** 65-91.
DREYER, B., LÜDEKE-FREUND, F., HAMANN, R. & FACCER, K. 2017. Upsides and downsides of the sharing economy: Collaborative consumption business models' stakeholder value impacts and their relationship to context. *Technological Forecasting and Social Change,* 125**,** 87-104.
ECKHARDT, G. M., BELK, R. & DEVINNEY, T. M. 2010. Why don't consumers consume ethically? *Journal of Consumer Behaviour,* 9**,** 426-436.
EDWARDS, J. B., MCKINNON, A. C. & CULLINANE, S. L. 2010. Comparative analysis of the carbon footprints of conventional and online retailing: A "last mile" perspective. *International Journal of Physical Distribution and Logistics Management,* 40**,** 103-123.
EESLEY, C. & LENOX, M. J. 2006. Firm responses to secondary stakeholder action. *Strategic management journal,* 27**,** 765-781.
EHMKE, J. F. & MATTFELD, D. C. 2012. Vehicle routing for attended home delivery in city logistics. *Procedia-Social and Behavioral Sciences,* 39**,** 622-632.
EISENHARDT, K. M. 1989. Building theories from case study research. *Academy of management review,* 14**,** 532-550.
EISENHARDT, K. M. & GRAEBNER, M. E. 2007. Theory building from cases: Opportunities and challenges. *Academy of management journal,* 50**,** 25-32.
ELKINGTON, J. & ROWLANDS, I. H. 1999. Cannibals with forks: the triple bottom line of 21st century business. *Alternatives Journal,* 25**,** 42.
ERMAGUN, A. & STATHOPOULOS, A. 2018. To bid or not to bid: An empirical study of the supply determinants of crowd-shipping. *Transportation Research Part A: Policy and Practice,* 116**,** 468-483.
ESPER, T. L., JENSEN, T. D., TURNIPSEED, F. L. & BURTON, S. 2003. The last mile: an examination of effects of online retail delivery strategies on consumers. *Journal of Business logistics,* 24**,** 177-203.
ESPINOSA-ORIAS, N. & SHARRATT, P. N. A hierarchical approach to stakeholder engagement. 13th CIRP International Conference on Life Cycle Engineering, Leuven, May, 2006. Citeseer.
FATNASSI, E., CHAOUACHI, J. & KLIBI, W. 2015. Planning and operating a shared goods and passengers on-demand rapid transit system for sustainable city-logistics. *Transportation Research Part B: Methodological,* 81**,** 440-460.
FELIU, J. G., AMBROSINI, C. & ROUTHIER, J. L. 2012. New trends on urban goods movement: Modelling and simulation of e-commerce distribution. *European Transport - Trasporti Europei*.
FLYNN, B. B., SAKAKIBARA, S., SCHROEDER, R. G., BATES, K. A. & FLYNN, E. J. 1990. Empirical research methods in operations management. *Journal of operations management,* 9**,** 250-284.
FORMAN, C., GHOSE, A. & GOLDFARB, A. 2009. Competition between local and electronic markets: How the benefit of buying online depends on where you live. *Management Science,* 55**,** 47-57.
FREEMAN, R. E. 1994. The Politics of Stakeholder Theory: Some Future Directions. *Business Ethics Quarterly,* 4**,** 409-421.

FREEMAN, R. E. 2010. *Strategic management: A stakeholder approach*, Cambridge university press.
FREEMAN, R. E., HARRISON, J. S., WICKS, A. C., PARMAR, B. L. & DE COLLE, S. 2010. *Stakeholder theory: The state of the art*, Cambridge University Press.
FREHE, V., MEHMANN, J. & TEUTEBERG, F. 2017. Understanding and assessing crowd logistics business models – using everyday people for last mile delivery. *Journal of Business and Industrial Marketing,* 32**,** 75-97.
FREUDENREICH, B., LÜDEKE-FREUND, F. & SCHALTEGGER, S. 2020. A stakeholder theory perspective on business models: Value creation for sustainability. *Journal of Business Ethics,* 166**,** 3-18.
FRIEDMAN, A. L. & MILES, S. 2006. *Stakeholders: Theory and practice*, Oxford University Press on Demand.
FROOMAN, J. 1999. Stakeholder influence strategies. *Academy of management review,* 24**,** 191-205.
FRYNAS, J. G. & YAMAHAKI, C. 2016. Corporate social responsibility: Review and roadmap of theoretical perspectives. *Business Ethics: A European Review,* 25**,** 258-285.
GALONSKE, N., RIEBE, E., TOUBOL, A. & WEISMANTEL, S. The ViWaS Project: Future-proof Solutions for Wagonload Transport. Transportation Research Procedia, 2016. 2850-2859.
GAN, M., JIANG, G. & LI, Z. Optimal model and solution algorithm of supply chain distribution problem associated with fixed charge and multiple transportation modes selection. 2009. 1517-1522.
GARGEYA, V. B. & BRADY, C. 2005. Success and failure factors of adopting SAP in ERP system implementation. *Business process management journal*.
GARVARE, R. & JOHANSSON, P. 2010. Management for sustainability–a stakeholder theory. *Total quality management,* 21**,** 737-744.
GATELY, C. K., HUTYRA, L. R. & WING, I. S. 2015. Cities, traffic, and CO2: A multidecadal assessment of trends, drivers, and scaling relationships. *Proceedings of the National Academy of Sciences,* 112**,** 4999-5004.
GE, S. & GAN, M. A Genetic Algorithm with Priority-Based Encoding for the Multistage Supply Chain Distribution Problem. International Conference on Transportation Engineering 2009, 2009. (pp. 1902-1908).
GELFAND, M. J., NISHII, L. H. & RAVER, J. L. 2006. On the nature and importance of cultural tightness-looseness. *Journal of Applied Psychology,* 91**,** 1225.
GENTA, S. & MUÑOZ, J. C. 2007. On assigning drivers for a home-delivery system on a performance basis. *Annals of Operations Research,* 155**,** 107-117.
GEVAERS, R., VAN DE VOORDE, E. & VANELSLANDER, T. Characteristics of innovations in last-mile logistics-using best practices, case studies and making the link with green and sustainable logistics. European Transport Conference, 2009, 2009.
GEVAERS, R., VAN DE VOORDE, E. & VANELSLANDER, T. 2011. Characteristics and typology of last-mile logistics from an innovation perspective in an urban context. *City Distribution and Urban Freight Transport: Multiple Perspectives, Edward Elgar Publishing***,** 56-71.
GHAJARGAR, M., ZENEZINI, G. & MONTANARO, T. 2016. Home delivery services: innovations and emerging needs. *IFAC-PapersOnLine,* 49**,** 1371-1376.
GHEZZI, A., MANGIARACINA, R. & PEREGO, A. 2012. Shaping the E-Commerce logistics strategy: A decision framework. *International Journal of Engineering Business Management,* 4**,** 1-13.

GIL, J. C. S. & MCNEIL, S. Supply Chain Outsourcing in Response to Manmade and Natural Disasters in Colombia, a Humanitarian Logistics Perspective. Procedia Engineering, 2015. 110-121.
GOETHALS, F., LECLERCQ-VANDELANNOITTE, A. & TÜTÜNCÜ, Y. 2012. French consumers' perceptions of the unattended delivery model for e-grocery retailing. *Journal of Retailing and Consumer Services,* 19**,** 133-139.
GONZALEZ-FELIU, J., PERBOLI, G., TADEI, R. & VIGO, D. 2008. The two-echelon capacitated vehicle routing problem.
GORDIJN, J. & AKKERMANS, H. 2001. Designing and evaluating e-business models. *IEEE intelligent Systems,* 16**,** 11-17.
GRAHAM, G., ÖSTERLE, I., ADITJANDRA, P. T., VAGHI, C., GREA, G. & ZUNDER, T. H. 2015. The role of a structured stakeholder consultation process within the establishment of a sustainable urban supply chain. *Supply Chain Management: An International Journal*.
GUBA, E. G. & LINCOLN, Y. S. 1994. Competing paradigms in qualitative research. *Handbook of qualitative research,* 2**,** 105.
HANCOCK, D. R. & ALGOZZINE, B. 2017. *Doing case study research: A practical guide for beginning researchers*, Teachers College Press.
HANDOKO, S. D. & LAU, H. C. Efficient order sharing with privacy preservation via double auction with split delivery. 2015 IEEE International Conference on Automation Science and Engineering (CASE), 2015. IEEE, 69-74.
HANDOKO, S. D., LAU, H. C. & CHENG, S. F. 2016. Achieving Economic and Environmental Sustainabilities in Urban Consolidation Center With Bicriteria Auction. *IEEE Transactions on Automation Science and Engineering,* 13**,** 1471-1479.
HANDOKO, S. D., NGUYEN, D. T. & LAU, H. C. An auction mechanism for the last-mile deliveries via urban consolidation centre. 2014 IEEE International Conference on Automation Science and Engineering (CASE), 2014. IEEE, 607-612.
HAO, Z. & ZHANG, M. Management optimization of tangible goods for e-commerce logistics process in Internet of things era. 2010 International Conference on Management and Service Science, 2010. IEEE, 1-4.
HARRINGTON, T. S., SINGH SRAI, J., KUMAR, M. & WOHLRAB, J. 2016. Identifying design criteria for urban system 'last-mile'solutions–a multi-stakeholder perspective. *Production Planning & Control,* 27**,** 456-476.
HARRINGTON, T. S. & SRAI, J. S. 2017. Understanding stages of supply network emergence in technology commercialisation. *International Journal of Manufacturing Technology and Management,* 31**,** 4-36.
HAYEL, Y., QUADRI, D., JIMÉNEZ, T. & BROTCORNE, L. 2016. Decentralized optimization of last-mile delivery services with non-cooperative bounded rational customers. *Annals of Operations Research,* 239**,** 451-469.
HODSON, H. 2013. Hand-delivered parcels find their way to you via the crowd. Elsevier.
HOLLOWAY, I. & TODRES, L. 2003. The status of method: flexibility, consistency and coherence. *Qualitative research,* 3**,** 345-357.
HOPKINS, D. & MCCARTHY, A. 2016. Change trends in urban freight delivery: A qualitative inquiry. *Geoforum,* 74**,** 158-170.
HÖRISCH, J., FREEMAN, R. E. & SCHALTEGGER, S. 2014. Applying stakeholder theory in sustainability management: Links, similarities, dissimilarities, and a conceptual framework. *Organization & Environment,* 27**,** 328-346.
HOSSAIN, M. & KAURANEN, I. 2015. Crowdsourcing: a comprehensive literature review. *Strategic Outsourcing: An International Journal,* 8**,** 2-22.

HOSTETLER, S. Determining package locations for delivery constrained truck loading utilizing shelves. IIE Annual Conference. Proceedings, 2010. Institute of Industrial and Systems Engineers (IISE), 1.
HOWE, J. 2008. *Crowdsourcing: How the power of the crowd is driving the future of business*, Random House.
HOWE, K., EISENHART, M. & BETEBENNER, D. 2002. The Price of Public School Choice. *Educational Leadership,* 59**,** 20-24.
HSU, C. L., CHEN, M. C., CHANG, K. C. & CHAO, C. M. 2010. Applying loss aversion to investigate service quality in logistics: A moderating effect of service convenience. *International Journal of Operations and Production Management,* 30**,** 508-525.
HUANG, L., XIE, G., BLENKINSOPP, J., HUANG, R. & BIN, H. 2020. Crowdsourcing for Sustainable Urban Logistics: Exploring the Factors Influencing Crowd Workers' Participative Behavior. *Sustainability,* 12**,** 3091.
HUANG, Y.-K., FAN, W.-S., HSIEH, C.-H., LAN, C.-H. & CHANG, R.-S. Using cusp catastrophe theory to model pick-up point choice behavior for online bookstore shopper. 2010 International Conference on Logistics Systems and Intelligent Management (ICLSIM), 2010. IEEE, 44-48.
HÜBNER, A., KUHN, H. & WOLLENBURG, J. 2016. Last mile fulfilment and distribution in omni-channel grocery retailing: A strategic planning framework. *International Journal of Retail and Distribution Management,* 44**,** 228-247.
HUGHES, M. 1998. Turning points in the lives of young inner-city men forgoing destructive criminal behaviors: A qualitative study. *Social Work Research,* 22**,** 143-151.
ITO, Y. Communication system for home delivery business derived from air combat history. 2015 Portland International Conference on Management of Engineering and Technology (PICMET), 2015. IEEE, 2531-2540.
JANKOWICZ, A. D. 2005. *Business research projects*, Cengage Learning EMEA.
JÄRVENSIVU, T. & TÖRNROOS, J.-Å. 2010. Case study research with moderate constructionism: Conceptualization and practical illustration. *Industrial marketing management,* 39**,** 100-108.
JASIAL, S. S., PAL, S. & BANSAL, S. Powering customer connectivity of products with last mile support services: Evidences from Indian passenger car manufacturing. 2016 12th International Conference on Industrial Engineering (ICIE), 2016. IEEE, 63-72.
JI, G. & LIU, W. Research on the logistics outsourcing based on e-commerce. 2011 International Conference on Business Management and Electronic Information, 2011. IEEE, 598-601.
KABASAKAL, H. & BODUR, M. 2002. Arabic cluster: a bridge between East and West. *Journal of World Business,* 37**,** 40-54.
KÄMÄRÄINEN, V., SARANEN, J. & HOLMSTRÄM, J. 2001. The reception box impact on home delivery efficiency in the e-grocery business. *International Journal of Physical Distribution and Logistics Management,* 31**,** 414-426.
KANNANGARA, S. N. & UGUCCIONI, P. 2013. Risk management in crowdsourcing-based business ecosystems. *Technology Innovation Management Review,* 3.
KEOY, K., HAFEEZ, K. & SIDDIQI, J. 2006. An empirical study of the key drivers and inhibitors towards e-business adoption: A multi-country comparison. *IADIS International Journal on WWW/Internet,* 5**,** 113-128.
KHAN K, A., BAKKAPPA, B., METRI, B. A. & SAHAY, B. S. 2009. Impact of agile supply chains' delivery practices on firms' performance: Cluster analysis and validation. *Supply Chain Management,* 14**,** 41-48.
KLASSEN, R. D. & VACHON, S. 2012. Greener supply chain management. *The Oxford Handbook of Business and the Natural Environment.*

KOHLER, T. & NICKEL, M. 2017. Crowdsourcing business models that last. *Journal of Business Strategy,* 38**,** 25-32.
KÖSTER, F., ULMER, M. W. & MATTFELD, D. C. Cooperative traffic control management for city logistic routing. Transportation Research Procedia, 2015. 673-682.
KULL, T. J., BOYER, K. & CALANTONE, R. 2007. Last-mile supply chain efficiency: an analysis of learning curves in online ordering. *International Journal of Operations & Production Management,* 27**,** 409-434.
LAM, T. & LI, C. 2015. *Crowdsourced Delivery* [Online]. Fung Business Intelligence Centre. [Accessed].
LANG, G. & BRESSOLLES, G. 2013. Economic performance and customer expectation in e-fulfillment systems: A multi-channel retailer perspective. *Supply Chain Forum,* 14**,** 16-26.
LE, T. V., STATHOPOULOS, A., VAN WOENSEL, T. & UKKUSURI, S. V. 2019. Supply, demand, operations, and management of crowd-shipping services: A review and empirical evidence. *Transportation Research Part C: Emerging Technologies,* 103**,** 83-103.
LEE, H. L. & WHANG, S. 2001. Winning the Last Mile of E-Commerce. *MIT Sloan Management Review,* 42**,** 54-62.
LEIDNER, R. 1993. *Fast food, fast talk: Service work and the routinization of everyday life*, Univ of California Press.
LEIMEISTER, J. M., HUBER, M., BRETSCHNEIDER, U. & KRCMAR, H. 2009. Leveraging crowdsourcing: activation-supporting components for IT-based ideas competition. *Journal of management information systems,* 26**,** 197-224.
LEWIS, M. W. 1998. Iterative triangulation: a theory development process using existing case studies. *Journal of operations Management,* 16**,** 455-469.
LI, X. & AI, X. Distribution channel under competing supply chain. 2015.
LIM, M. K., MAK, H. Y. & SHEN, Z. J. M. 2017. Agility and proximity considerations in supply chain design. *Management Science,* 63**,** 1026-1041.
LIM, S. F. W., JIN, X. & SRAI, J. S. 2018. Consumer-driven e-commerce. *International Journal of Physical Distribution & Logistics Management*.
LIM, S. F. W. T., XIN, J. & SRAI, J. 2015. *Last-mile logistics models: A literature review and design guideline*.
LIN, C. C. & YU, C. S. A heuristic algorithm for the three-dimensional container packing problem with zero unloading cost constraint. 2007. 4637-4642.
LINCOLN, Y. S. & GUBA, E. G. 2000. The only generalization is: There is no generalization. *Case study method***,** 27-44.
LINDAWATI, VAN SCHAGEN, J., GOH, M. & DE SOUZA, R. 2014. Collaboration in urban logistics: Motivations and barriers. *International Journal of Urban Sciences,* 18**,** 278-290.
LINDNER, J. 2011. Last Mile Logistics Capability: a Multidimensional System Requirements Analysis for a General Modeling and Evaluation Approach. *Dipl Technical university of Munich*.
LIU, R., XIE, X. & GARAIX, T. 2014. Hybridization of tabu search with feasible and infeasible local searches for periodic home health care logistics. *Omega (United Kingdom),* 47**,** 17-32.
LIU, Y.-G., GUANG, H. & LUO, X. A Level of Service Based Planning Model for Distribution Network Design. International Conference on Transportation Engineering 2007, 2007. 4112-4117.

LÓPEZ, R. A. & FERRÁNDIZ, J. V. C. Analysis of the Logistics of Home Delivery of Food and Household Goods. Implementation in Consum in the Valencia Area. Proposals for Improvement. Transportation Research Procedia, 2016. 189-196.
LUJING, L. The dilemma and way out faced by the logistics industry in China under e-commerce conditions. 2011 International Conference on Business Management and Electronic Information, 2011. IEEE, 215-218.
MACHARIS, C. & KIN, B. 2017. The 4 A's of sustainable city distribution: Innovative solutions and challenges ahead. *International Journal of Sustainable Transportation,* 11**,** 59-71.
MAGRETTA, J. 2002. Why business models matter. Harvard Business School Boston, MA.
MAIR, J. & REISCHAUER, G. Impact and variety of the sharing economy: Perspectives for field-level research. 32nd European Group of Organizational Studies Colloquium (EGOS 2016), sub-theme "Organizing in the Shadow of Sharing" July, 2016. 7-9.
MAKKI, E. & CHANG, L. E-commerce in Saudi Arabia: Acceptance and implementation difficulties. Proceedings of the International Conference on e-Learning, e-Business, Enterprise Information Systems, and e-Government (EEE), 2014. The Steering Committee of The World Congress in Computer Science, Computer …, 1.
MANGIARACINA, R., MARCHET, G., PEROTTI, S. & TUMINO, A. 2015. A review of the environmental implications of B2C e-commerce: a logistics perspective. *International Journal of Physical Distribution and Logistics Management,* 45**,** 565-591.
MARTÍNEZ, L. & AMAYA, C. A. 2013. A vehicle routing problem with multi-trips and time windows for circular items. *Journal of the Operational Research Society,* 64**,** 1630-1643.
MASON 2002. Qualitative researching. *University of Manchester, UK: Sage Publishings*.
MCCUTCHEON, D. M. & MEREDITH, J. R. 1993. Conducting case study research in operations management. *Journal of operations management,* 11**,** 239-256.
MCINERNEY, J., ROGERS, A. & JENNINGS, N. R. 2013. Bus, bike and random journeys: Crowdsourcing aid distribution in Ivory Coast. *Significance,* 10**,** 4-9.
MCKINNON, A. 2015. City logistics innovations: game-changers or over-hyped curiosities. *TRB Executive Committee, Washington DC, USA*.
MCKINNON, A. & BILSKI, B. 2015. Innovations in global logistics. *Breakthrough: From Innovation to Impact***,** 19-38.
MCKINNON, A. C. 2016. The possible impact of 3D printing and drones on last-mile logistics: An exploratory study. *Built Environment,* 42**,** 617-629.
MEHMANN, J., FREHE, V. & TEUTEBERG, F. 2015. Crowd logistics− a literature review and maturity model. *Innovations and Strate Logistics and Supply Ch,* 117.
MELACINI, M., PEROTTI, S., RASINI, M. & TAPPIA, E. 2018. E-fulfilment and distribution in omni-channel retailing: a systematic literature review. *International Journal of Physical Distribution & Logistics Management*.
MENTZER, J. T., FLINT, D. J. & HULT, G. T. M. 2001. Logistics service quality as a segment-customized process. *Journal of marketing,* 65**,** 82-104.
MEREDITH, J. 1998. Building operations management theory through case and field research. *Journal of operations management,* 16**,** 441-454.
MILES, M. B. & HUBERMAN, A. M. 1994. *Qualitative data analysis: An expanded sourcebook*, sage.
MILES, M. B., HUBERMAN, A. M. & SALDAÒA, J. 2020. *Qualitative data analysis : a methods sourcebook*.

MITCHELL, R. K., AGLE, B. R. & WOOD, D. J. 1997. Toward a theory of stakeholder identification and salience: Defining the principle of who and what really counts. *Academy of management review,* 22**,** 853-886.
MLADENOW, A. 2016. "Crowd logistics": the contribution of social crowds in logistics activities. *International Journal of Web Information Systems,* 12**,** 379-396.
MLADENOW, A., BAUER, C. & STRAUSS, C. Crowdsourcing in logistics: Concepts and applications using the social crowd. 17th International Conference on Information Integration and Web-Based Applications and Services, iiWAS 2015 - Proceedings, 2015.
MLADENOW, A., BAUER, C. & STRAUSS, C. 2016. "crowd logistics": The contribution of social crowds in logistics activities. *International Journal of Web Information Systems,* 12**,** 379-396.
MÖHLMANN, M. 2015. Collaborative consumption: determinants of satisfaction and the likelihood of using a sharing economy option again. *Journal of Consumer Behaviour,* 14**,** 193-207.
MONTIEL, I. & DELGADO-CEBALLOS, J. 2014. Defining and measuring corporate sustainability: Are we there yet? *Organization & Environment,* 27**,** 113-139.
MORGANTI, E. & BROWNE, M. 2018. Technical and operational obstacles to the adoption of electric vans in France and the UK: An operator perspective. *Transport Policy,* 63**,** 90-97.
MORGANTI, E., SEIDEL, S., BLANQUART, C., DABLANC, L. & LENZ, B. The Impact of E-commerce on Final Deliveries: Alternative Parcel Delivery Services in France and Germany. Transportation Research Procedia, 2014. 178-190.
MOSELEY, M. J. & OWEN, S. 2008. The future of services in rural England: The drivers of change and a scenario for 2015. *Progress in Planning,* 69**,** 93-130.
MUELLER, A. & FLEMING, T. 2001. Cooperative learning: Listening to how children work at school. *The Journal of Educational Research,* 94**,** 259-265.
MUKHERJEE, A., MITCHELL, W. & TALBOT, F. B. 2000. The impact of new manufacturing requirements on production line productivity and quality at a focused factory. *Journal of Operations Management,* 18**,** 139-168.
Muñoz-Villamizar, A., Montoya-Torres, J.R. and Vega-Mejía, C.A., 2015. Non-collaborative versus collaborative last-mile delivery in urban systems with stochastic demands. Procedia CIRP, 30, pp.263-268.
MUÑUZURI, J., CORTÉS, P., ONIEVA, L. & GUADIX, J. 2009. Modeling freight delivery flows: Missing link of urban transport analysis. *Journal of Urban Planning and Development,* 135**,** 91-99.
MURPHY, A. J. 2007. Grounding the virtual: The material effects of electronic grocery shopping. *Geoforum,* 38**,** 941-953.
MYERS, J. 2009. Home delivery at the Orange County Library System: An exemplar from the USA. *Interlending and Document Supply,* 37**,** 84-86.
MYERS, M. D. & AVISON, D. 2002. *Qualitative research in information systems: a reader*, Sage.
NÄSLUND, D. 2002. Logistics needs qualitative research-especially action research. International Journal of Physical Distribution & Logistics Management, 32, 321-338.
NATHNAIL, E., GOGAS, M. & ADAMOS, G. Urban Freight Terminals: A Sustainability Cross-case Analysis. Transportation Research Procedia, 2016. 394-402.
NATION, U. 2018. World Urbanization Prospects.
NEUMAN, W. L. 2000. The meanings of methodology. Social research methods, 60, 87.

Nguyen, D.T., Lau, H.C. and Kumar, A., 2015, August. Decomposition techniques for urban consolidation problems. In 2015 IEEE International Conference on Automation Science and Engineering (CASE) (pp. 57-62). IEEE.
OHNEMUS, M. & PERL, A. 2016. Shared autonomous vehicles: Catalyst of new mobility for the last mile? *Built Environment,* 42**,** 589-602.
OLIVEIRA, C. M. D., ALBERGARIA DE MELLO BANDEIRA, R., VASCONCELOS GOES, G., SCHMITZ GONÇALVES, D. N. & D'AGOSTO, M. D. A. 2017. Sustainable vehicles-based alternatives in last mile distribution of urban freight transport: A systematic literature review. *Sustainability,* 9**,** 1324.
OLSSON, J., HELLSTRÖM, D. & PÅLSSON, H. 2019. Framework of last mile logistics research: A systematic review of the literature. *Sustainability,* 11**,** 7131.
OTLEY, D. T. & BERRY, A. J. 1994. Case study research in management accounting and control. *Management accounting research,* 5**,** 45-65.
PALOHEIMO, H., LETTENMEIER, M. & WARIS, H. 2016. Transport reduction by crowdsourced deliveries–a library case in Finland. *Journal of Cleaner Production,* 132**,** 240-251.
PARK, H., PARK, D. & JEONG, I. J. 2016. An effects analysis of logistics collaboration in last-mile networks for CEP delivery services. Transport Policy, 50, 115-125.
PATTON, M. Q. 1999. Enhancing the quality and credibility of qualitative analysis. Health services research, 34, 1189.
Petrovic, O., Harnisch, M.J. and Puchleitner, T., 2013, May. Opportunities of mobile communication systems for applications in last-mile logistics. In 2013 International Conference on Advanced Logistics and Transport (pp. 354-359). IEEE.
PETTIGREW, A. & MCNULTY, T. 1995. Power and influence in and around the boardroom. Human relations, 48, 845-873.
PHILLIPS, R., FREEMAN, R. E. & WICKS, A. C. 2003. What stakeholder theory is not. *Business ethics quarterly,* 13**,** 479-502.
PLACE, A. W. & WOOD, G. S. 1999. A Case Study of Traditionally Underrepresented Individuals' Experiences in a Doctoral Program. *Journal for a Just and Caring Education,* 5**,** 442-55.
POTTS, D. 2008. Library Loans Online: A new channel for a traditional service in England. *Interlending and Document Supply,* 36**,** 149-151.
PRADO, A. M., CALDERON, D. & ZÚÑIGA, R. 2016. Providing low-cost and high-quality medications to rural communities in developing countries: The case of Accion Medica Cristiana in Nicaragua. *Journal of Business Research,* 69**,** 3910-3922.
PRIEM, R. L. 2007. A consumer perspective on value creation. *Academy of Management Review,* 32**,** 219-235.
PUNAKIVI, M. & SARANEN, J. 2001. Identifying the success factors in e-grocery home delivery. *International Journal of Retail & Distribution Management,* 29**,** 156-163.
PUNAKIVI, M., YRJÖLÄ, H. & HOLMSTRÖM, J. 2001. Solving the last mile issue: Reception box or delivery box? *International Journal of Physical Distribution and Logistics Management,* 31**,** 427-439.
PUNEL, A., ERMAGUN, A. & STATHOPOULOS, A. 2018. Studying determinants of crowd-shipping use. *Travel Behaviour and Society,* 12**,** 30-40.
PUNEL, A., ERMAGUN, A. & STATHOPOULOS, A. 2019. Push and pull factors in adopting a crowdsourced delivery system. *Transportation Research Record,* 2673**,** 529-540.
PUNEL, A. & STATHOPOULOS, A. 2017a. Modeling the acceptability of crowdsourced goods deliveries: Role of context and experience effects. *Transportation Research Part E: Logistics and Transportation Review,* 105**,** 18-38.

PUNEL, A. & STATHOPOULOS, A. 2017b. Modeling the acceptability of crowdsourced goods deliveries: Role of context and experience effects. *Transportation Research Part E: Logistics and Transportation Review,* 105**,** 18-38.
QI, W., LI, L., LIU, S. & SHEN, Z.-J. M. 2018. Shared mobility for last-mile delivery: Design, operational prescriptions, and environmental impact. *Manufacturing & Service Operations Management,* 20**,** 737-751.
QUAK, H. & TAVASSZY, L. 2011. Customized solutions for sustainable city logistics: the viability of urban freight consolidation centres. *Transitions towards sustainable mobility.* Springer.
RAI, H. B., VERLINDE, S. & MACHARIS, C. 2019. City logistics in an omnichannel environment. The case of Brussels. *Case Studies on Transport Policy,* 7**,** 310-317.
RAI, H. B., VERLINDE, S., MERCKX, J. & MACHARIS, C. 2017. Crowd logistics: an opportunity for more sustainable urban freight transport? *European Transport Research Review,* 9.
RANIERI, L., DIGIESI, S., SILVESTRI, B. & ROCCOTELLI, M. 2018. A review of last mile logistics innovations in an externalities cost reduction vision. *Sustainability,* 10**,** 782.
RAO, S. & MURTHY, S. S. 2014. The Last Mile: Gateway to rural empowerment in India. *Field Actions Science Report,* 2014.
RENNEMO, S. J., RØ, K. F., HVATTUM, L. M. & TIRADO, G. 2014. A three-stage stochastic facility routing model for disaster response planning. *Transportation Research Part E: Logistics and Transportation Review,* 62**,** 116-135.
RIESSMAN, C. K. 1993. *Narrative analysis*, Sage.
ROUGÈS, J.-F. & MONTREUIL, B. Crowdsourcing delivery: New interconnected business models to reinvent delivery. 1st international physical internet conference, 2014. 1-19.
ROWLEY, T. I. & MOLDOVEANU, M. 2003. When will stakeholder groups act? An interest-and identity-based model of stakeholder group mobilization. Academy of management review, 28, 204-219.
Ryan, B., 2002. Research methods and methodology in finance and accounting. Cengage Learning EMEA.
RZEŚNY-CIEPLIŃSKA, J. & SZMELTER-JAROSZ, A. 2019. Assessment of the Crowd Logistics Solutions—The Stakeholders' Analysis Approach. Sustainability, 11, 5361.
SAMPAIO, E. Q. D. & SAMPAIO, M. 2015. Managerial response to stockouts: The effect of remedies on consumer behavior. Producao, 26, 66-77.
SANCHEZ, P. & RICART, J. E. 2010. Business model innovation and sources of value creation in low-income markets. *European management review,* 7**,** 138-154.
SAUNDERS, M., LEWIS, P. & THORNHILL, A. 2009. *Research methods for business students*, Pearson education.
SAVAGE, G. T., NIX, T. W., WHITEHEAD, C. J. & BLAIR, J. D. 1991. Strategies for assessing and managing organizational stakeholders. *Academy of management perspectives,* 5**,** 61-75.
SAVELSBERGH, M. & VAN WOENSEL, T. 2016a. 50th anniversary invited article—city logistics: Challenges and opportunities. *Transportation Science,* 50**,** 579-590.
SAVELSBERGH, M. & VAN WOENSEL, T. 2016b. City logistics: Challenges and opportunities. *Transportation Science,* 50**,** 579-590.
SCHALTEGGER, S., HÖRISCH, J. & FREEMAN, R. E. 2019. Business cases for sustainability: A stakeholder theory perspective. *Organization & Environment,* 32**,** 191-212.

SCHALTEGGER, S., LÜDEKE-FREUND, F. & HANSEN, E. G. 2011. Business cases for sustainability and the role of business model innovation: developing a conceptual framework. *Centre for Sustainability Management (CSM), Leuphana Universität Lüneburg*.

SCHAU, V., ROSSAK, W., HEMPEL, H. & SPATHE, S. Smart City Logistik Erfurt (SCL): ICT-support for managing fully electric vehicles in the domain of inner city freight traffic: A Look at an ongoing federal project in the City of Erfurt, Germany. 2015.

SCHREIECK, M., PFLÜGLER, C., DEHNER, C., VAIDYA, S., BÖNISCH, S., WIESCHE, M. & KRCMAR, H. 2016. A concept of crowdsourced delivery for small local shops. *Informatik 2016*.

SCHWANDT, T. A., LINCOLN, Y. S. & GUBA, E. G. 2007. Judging interpretations: But is it rigorous? Trustworthiness and authenticity in naturalistic evaluation. New directions for evaluation, 114, 11-25.

Shao, G., Wang, Z. and Yue, W., 2012. Study on Risk Control of E-Commerce Logistics Based on QFD. In ICLEM 2012: Logistics for Sustained Economic Development—Technology and Management for Efficiency (pp. 653-658).

SIDDAWAY, A. 2014. What is a systematic literature review and how do I do one. University of Stirling, 1, 1-13.

SILVESTRE, B. S. 2015. Sustainable supply chain management in emerging economies: Environmental turbulence, institutional voids and sustainability trajectories. *International Journal of Production Economics,* 167**,** 156-169.

SINGH, A. K., SUBRAMANIAN, N., PAWAR, K. S. & BAI, R. 2016. Cold chain configuration design: location-allocation decision-making using coordination, value deterioration, and big data approximation. *Annals of Operations Research***,** 1-25.

SLABINAC, M. 2015. Innovative solutions for a "Last-Mile" delivery–a European experience. *Business Logistics in Modern Management*.

SMITH, J. K. 1983. Quantitative versus qualitative research: An attempt to clarify the issue. *Educational researcher,* 12**,** 6-13.

SODHI, M. S. & TANG, C. S. 2014. Buttressing supply chains against floods in Asia for humanitarian relief and economic recovery. *Production and Operations Management,* 23**,** 938-950.

SOUBBOTINA, T. P. 2004. *Beyond economic growth: An introduction to sustainable development*, The World Bank.

STAKE, R. E. 1995. *The art of case study research*, sage.

STARKEY, A. 2010. E-Retail - Using home delivery as a service differentiator and strategic marketing tool. *Journal of Direct, Data and Digital Marketing Practice,* 12**,** 165-173.

TANIGUCHI, E., THOMPSON, R. G. & YAMADA, T. Modelling city logistics. INTERNATIONAL CONFERENCE ON CITY LOGISTICS, 1ST, 1999, CAIRNS, QUEENSLAND, AUSTRALIA, 1999.

TANIGUCHI, E., YAMADA, T. & OKAMOTO, M. 2007. Multi-agent modelling for evaluating dynamic vehicle routing and scheduling systems. *Journal of the Eastern Asia Society for Transportation Studies,* 7**,** 933-948.

TEECE, D. J. 2010. Business models, business strategy and innovation. *Long range planning,* 43**,** 172-194.

TELLER, C., KOTZAB, H. & GRANT, D. B. 2006. The consumer direct services revolution in grocery retailing: An exploratory investigation. *Managing Service Quality,* 16**,** 78-96.

TERWIESCH, C. & XU, Y. 2008. Innovation contests, open innovation, and multiagent problem solving. *Management science,* 54**,** 1529-1543.

TUNCA, M. Z. & ABOELMAGED, M. G. Distribution systems for electronic commerce. 2000. 645-647.
UNITEDNATIONS. 2018. *Human development reports* [Online]. Available: http://hdr.undp.org/en/data [Accessed].
VARGO, S. L. & LUSCH, R. F. 2004. Evolving to a new dominant logic for marketing. *Journal of marketing,* 68**,** 1-17.
VARGO, S. L. & LUSCH, R. F. 2008. Service-dominant logic: continuing the evolution. *Journal of the Academy of marketing Science,* 36**,** 1-10.
VENKATADRI, U., KRISHNA, K. S. & ÜLKÜ, M. A. 2016. On Physical Internet Logistics: Modeling the Impact of Consolidation on Transportation and Inventory Costs. *IEEE Transactions on Automation Science and Engineering,* 13**,** 1517-1527.
VERLINDE, S., MACHARIS, C., MILAN, L. & KIN, B. Does a Mobile Depot Make Urban Deliveries Faster, More Sustainable and More Economically Viable: Results of a Pilot Test in Brussels. Transportation Research Procedia, 2014. 361-373.
VISSER, J., NEMOTO, T. & BROWNE, M. 2014. Home delivery and the impacts on urban freight transport: A review. *Procedia-social and behavioral sciences,* 125**,** 15-27.
VOSS, C., TSIKRIKTSIS, N. & FROHLICH, M. 2002. Case research in operations management. *International journal of operations & production management*.
VULLIAMY, G., LEWIN, K. & STEPHENS, D. 1990. *Doing educational research in developing countries: Qualitative strategies*, Routledge.
WAHYUNI, D. 2012. The research design maze: Understanding paradigms, cases, methods and methodologies. *Journal of applied management accounting research,* 10**,** 69-80.
WALLIMAN, N. 2011. *Your research project: Designing and planning your work*, Sage Publications.
WANG, C., MAO, Z., O'KANE, J. & WANG, J. 2016a. An exploration on e-retailers' home delivery – strategic elements and their prioritisation. *Business Process Management Journal,* 22**,** 614-633.
WANG, Y., ZHANG, D., LIU, Q., SHEN, F. & LEE, L. H. 2016b. Towards enhancing the last-mile delivery: An effective crowd-tasking model with scalable solutions. *Transportation Research Part E: Logistics and Transportation Review,* 93**,** 279-293.
WEIGEL, D. & CAO, B. 1999. Applying GIS and OR techniques to solve Sears technician-dispatching and home-delivery problems. *Interfaces,* 29**,** 112-130.
WELTEVREDEN, J. W. J. 2008. B2c e-commerce logistics: The rise of collection-and-delivery points in the Netherlands. *International Journal of Retail and Distribution Management,* 36**,** 638-660.
WHEELER, F. P. 2001. A bayesian approach to service level performance monitoring in supplier, provider relationships. *Journal of the Operational Research Society,* 52**,** 383-390.
WILDING, R., WAGNER, B., SEURING, S. & GOLD, S. 2012. Conducting content-analysis based literature reviews in supply chain management. *Supply Chain Management: An International Journal*.
WILKINSON, S. 2000. Women with breast cancer talking causes: Comparing content, biographical and discursive analyses. *Feminism & Psychology,* 10**,** 431-460.
WOHLRAB, J., HARRINGTON, T. & SRAI, J. Last Mile Logistics Evaluation-Customer Industrial and Institutional Perspectives. 23rd Annual Production and Operations Management Society (POMS) Conference, Chicago, Illinois, USA, 2012.
WORLDBANK. 2018. *Logistics perofromance indocators index* [Online]. Available: https://lpi.worldbank.org/international/global [Accessed].

XIAN, H. 2008. Lost in translation? Language, culture and the roles of translator in cross-cultural management research. *Qualitative Research in Organizations and Management: An International Journal,* 3**,** 231-245.
XING, Y., GRANT, D. B., MCKINNON, A. C. & FERNIE, J. 2010. Physical distribution service quality in online retailing. *International Journal of Physical Distribution and Logistics Management,* 40**,** 415-432.
XU, J., JIANG, L. & LI, Y. 2013. Service requirement for terminal delivery: An empirical study from the perspective of online shoppers. *Journal of Industrial Engineering and Management,* 6**,** 1223-1237.
XU, S. X., CHENG, M. & HUANG, G. Q. 2015. Efficient intermodal transportation auctions for B2B e-commerce logistics with transaction costs. *Transportation Research Part B: Methodological,* 80**,** 322-337.
XU, S. X. & HUANG, G. Q. 2017. Efficient Multi-Attribute Multi-Unit Auctions for B2B E-Commerce Logistics. *Production and Operations Management,* 26**,** 292-304.
YANG, X. P. & YI, J. B. Research on the electronic commerce logistics of large and medium-sized household appliances and fuzzy control mode. 2010. 1557-1561.
YE, H. J. & KANKANHALLI, A. 2017. Solvers' participation in crowdsourcing platforms: Examining the impacts of trust, and benefit and cost factors. *The Journal of Strategic Information Systems,* 26**,** 101-117.
YIN, R. 2003. Designing case studies. *Qualitative Research Methods***,** 359-386.
YIN, R. K. Case study research: Design and methods 4th edition. United States: Library of Congress Cataloguing-in-Publication Data, 2009.
YRJÖLÄ, H. 2001. Physical distribution considerations for electronic grocery shopping. *International Journal of Physical Distribution and Logistics Management,* 31**,** 746-761.
YU, Y., WANG, X., ZHONG, R. Y. & HUANG, G. Q. E-commerce Logistics in Supply Chain Management: Practice Perspective. 2016. 179-185.
ZHANG, B. Y., LI, N. L., FAN, X. C. & LIU, Z. H. The distribution mode analysis and optimization modeling of regional Fast Moving Consumer Goods. 2011. 1549-1552.
ZHANG, M., PRATAP, S., HUANG, G. Q. & ZHAO, Z. 2017. Optimal collaborative transportation service trading in B2B e-commerce logistics. International Journal of Production Research, 1-17.
Zhang, S.Z. and Lee, C.K.M., 2016, December. Flexible vehicle scheduling for urban last mile logistics: The emerging technology of shared reception box. In 2016 IEEE International Conference on Industrial Engineering and Engineering Management (IEEM) (pp. 1913-1917). IEEE.

# Appendices

***Published work:***

ALHARBI, A., CANTARELLI, C. & BRINT, A. 2022. Crowd Models for Last Mile Delivery in an Emerging Economy. *Sustainability,* 14**,** 1401.
(Alharbi et al., 2022)

https://doi.org/10.3390/su14031401

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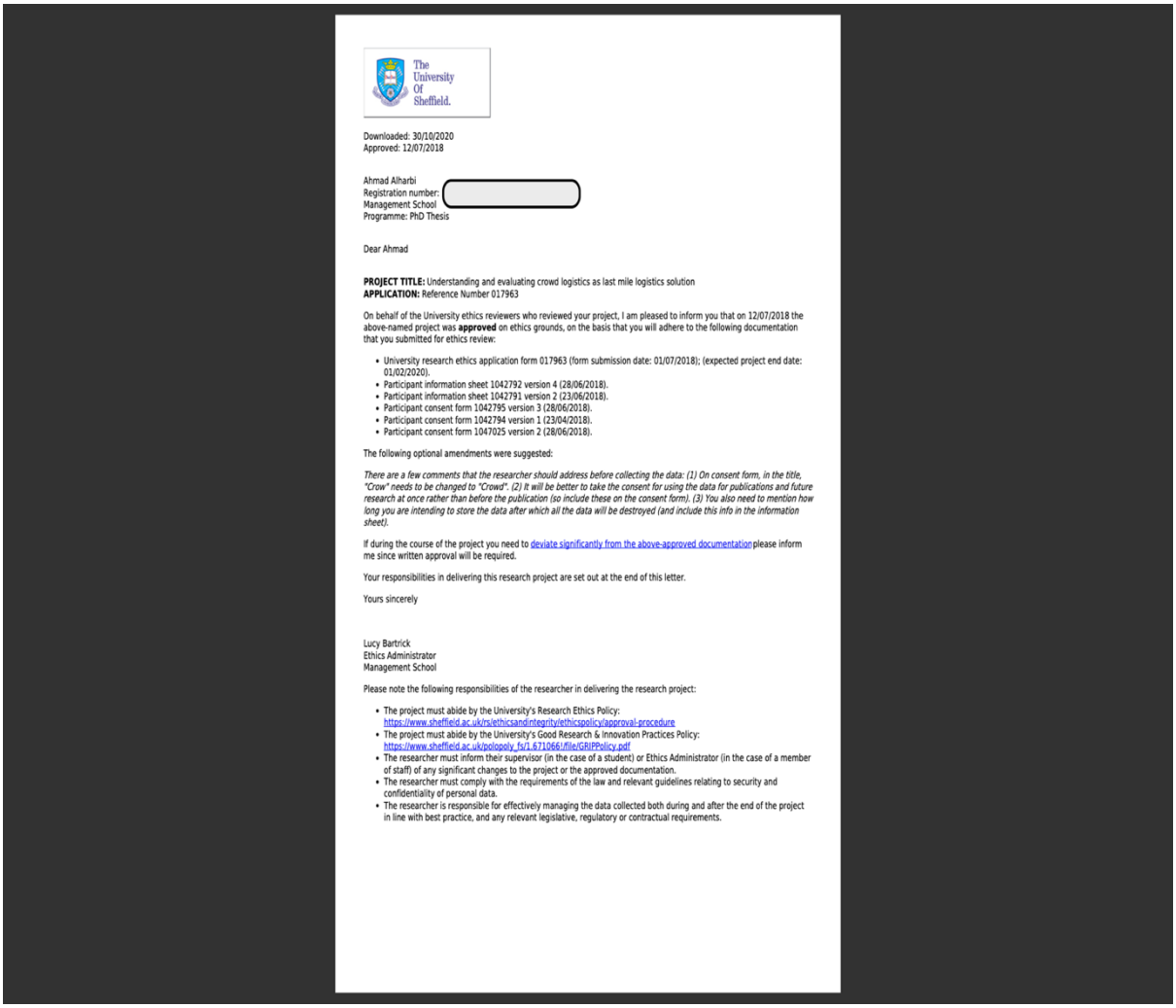

The University Of Sheffield.

Downloaded: 30/10/2020
Approved: 12/07/2018

Ahmad Alharbi
Registration number: [redacted]
Management School
Programme: PhD Thesis

Dear Ahmad

**PROJECT TITLE:** Understanding and evaluating crowd logistics as last mile logistics solution
**APPLICATION:** Reference Number 017963

On behalf of the University ethics reviewers who reviewed your project, I am pleased to inform you that on 12/07/2018 the above-named project was **approved** on ethics grounds, on the basis that you will adhere to the following documentation that you submitted for ethics review:

- University research ethics application form 017963 (form submission date: 01/07/2018); (expected project end date: 01/02/2020).
- Participant information sheet 1042792 version 4 (28/06/2018).
- Participant information sheet 1042791 version 2 (23/06/2018).
- Participant consent form 1042795 version 3 (28/06/2018).
- Participant consent form 1042794 version 1 (23/04/2018).
- Participant consent form 1047025 version 2 (28/06/2018).

The following optional amendments were suggested:

*There are a few comments that the researcher should address before collecting the data: (1) On consent form, in the title, "Crow" needs to be changed to "Crowd". (2) It will be better to take the consent for using the data for publications and future research at once rather than before the publication (so include these on the consent form). (3) You also need to mention how long you are intending to store the data after which all the data will be destroyed (and include this info in the information sheet).*

If during the course of the project you need to deviate significantly from the above-approved documentation please inform me since written approval will be required.

Your responsibilities in delivering this research project are set out at the end of this letter.

Yours sincerely

Lucy Bartrick
Ethics Administrator
Management School

Please note the following responsibilities of the researcher in delivering the research project:

- The project must abide by the University's Research Ethics Policy: https://www.sheffield.ac.uk/rs/ethicsandintegrity/ethicspolicy/approval-procedure
- The project must abide by the University's Good Research & Innovation Practices Policy: https://www.sheffield.ac.uk/polopoly_fs/1.671066!/file/GRIPPolicy.pdf
- The researcher must inform their supervisor (in the case of a student) or Ethics Administrator (in the case of a member of staff) of any significant changes to the project or the approved documentation.
- The researcher must comply with the requirements of the law and relevant guidelines relating to security and confidentiality of personal data.
- The researcher is responsible for effectively managing the data collected both during and after the end of the project in line with best practice, and any relevant legislative, regulatory or contractual requirements.

***Interviews questions guidelines:***

*Table 22 Interviews guideline*

| These questions were used as guideline to answer RQs. Questions were gathered after reading the literature and hence included some factors from the literature. However, more questions were asked during the interviews as follow-up questions and for more clarification. Furthermore, some answers led to different questions being asked than the listed ones. |
|---|
| Interview guideline for RQ1- Individual and industrial stakeholders |

| Interview Questions | Purpose of the questions and notes |
|---|---|
| First, I would like to ask you about the CLD services in general. What do you know about CLD? | To make sure the interviewee understands the topic of my research before we keep going further. In addition, it allows the researcher to open follow-up questions to gain more understanding of the topic of the research in general. |
| Can you explain what you use CLD for? INDV. | This question indicates the role of the interviewee as a stakeholder. In other words, to combine the stakeholder group after the data collection. |
| What do other people around you think of CLD? | Here the researcher tries to capture the popularity of the CLD and more comprehensive understanding. |
| Can you explain how the CLD you use works?<br>*Potential follow-up questions:*<br>*Can you elaborate more about the process/operation of the delivery?*<br>*Do you know of any other application that uses the same way of operation or others?*<br><br>Can you explain how your CLD business model works? Who are the parties involved? INDS. | This question identifies the business models the interviewees use and provides details of how it works. This question identifies how the CLD works by giving the interviewee the space to describe it from his/her point of view. It also identifies the key stakeholders of a business model.<br><br>*Here is to explore more implementations* |

| | |
|---|---|
| Can you talk about the registration? How do you register?<br>How do you evaluate the registration process?<br>BOTH | This question clarifies the main steps in the implementation of CLD. Also, the question tries to explain the role and practice of individual stakeholders in CLD. In addition, whether or not the popularity of the CLD is linked with the ease/difficultness of registration. |
| Can you explain the payment process?<br>How do you evaluate the payment method?<br>BOTH | That explains the last phase of the operation of CLD. |
| Product flow path<br>BOTH | Here tries to understand how the items move from the customer's perspectives to have better understanding of the mechanism of the business model |

| RQ2 – individual stakeholders | |
|---|---|
| Interview Questions | Purpose of the questions and notes |
| Can you tell me when you started using CLD? | This question indicates the length and the likelihood of using CLD as a LM solution |
| Can you tell me why you started using CLD?<br>*Follow up questions:*<br>*How often do you use it? What did you like the most? How is it different from traditional usage, e.g. restaurants, grocery deliveries?* | This is a general question to give the interviewee room to explain the values CLD provides from his/her perspectives. In other words, to have an overview of the main values before the researcher asks about specific dimensions.<br><br>*Here try to see the trade-off of the feature that motivates the individual the most.* |
| I would like to ask you how CLD provides value as a last mile delivery solution?<br>*Elaboration: How is it better as a last mile solution?* | |
| Have you used Traditional or LSPs before like …, …, … etc.? If so, can you tell me how it is different from CLD in terms of features and values you receive?<br>*This question depends on the Business model the individual uses.* | Here trying to see the values from different aspects by looking at the features the CLD has that LSPs don't |
| Factors from LM and CLD literature to cover:<br>*Speed of delivery*<br>*Price*<br>*Flexibility* | This question identifies how the CLD works by giving the interviewee the space to describe it from his/her point of view. |

| | |
|---|---|
| | *Ask the interviewee their opinion about the role of these factors on values.* |
| Moving on now to the values you receive as an individual. What CLD benefits/values do you get as an individual when using the CLD as a last mile solution? Besides the economic/operational ones you mentioned in the previous questions.<br><br>*Gaining more money, trying a new experience, as mentioned in the literature.* | Here tries to identify the general social values provided to the stakeholder |

| RQ2 – industrial stakeholders | |
|---|---|
| Interview Questions | Purpose of the questions and notes |
| Can you tell me when you started your CLD application? | This question indicates the length and the likelihood of CLD as a LM solution |
| Can you tell me why you started a CLD business?<br>*Follow up questions:*<br>*How is it different from traditional delivery? If has not been answered in RQ1* | Here to see the motivation |
| I would like to ask you how CLD provides value as a last mile delivery solution?<br>*Elaboration: How is it better as a last mile solution?* | |
| How are the values the CLD provides different than the traditional delivery?<br>*Follow up: how do you contribute in that, and how can you maintain providing values at the operational, social, economic, and environmental levels?* | Here trying to see the values from different aspects by looking at the features the CLD has that LSPs don't provide. |

| | Sustainability- All | |
|---|---|---|
| | Interview Questions | Purpose of the questions and notes |
| General question about sustainability understanding | Can you tell me what your understanding is when you hear the term sustainability? | To see how the interviewee defines sustainability in his perspective. In addition, it allows the researcher to open follow-up questions to gain more understanding of sustainability. |
| | Sustainability is generally considered in three different forms:, economic, social, and environmental. How important are these three dimensions: economic, environmental, and social, to you as a customer/owner/regulator? | This question indicates the trade-off in the three dimensions and if the stakeholder focusses on one dimension more than others that influence the sustainability. |
| | Can you tell me which dimension you contribute to more? And why?<br>*If haven't answered previously.* | |
| | Do you see yourself as motivated by any of the dimensions of sustainability to use CLD? Can you tell me which ones and why? | |
| Sustainability factors in business model and CLD | How about the factors you think affect the business model's (the application you use) sustainability? | Here the researcher tries to capture the sustainability factors the stakeholder focusses on. |
| | Do you think the current implementation of CLD is meeting sustainability targets? Why or why not? | To understand the mentality |
| | How can the CLD business model be sustainable? | That explains the last phase of the operation of CLD |

| | | |
|---|---|---|
| | Do you see CLD as a last mile solution as environmentally friendly solution? If so, why? | |
| | Do you see the environmental value the CLD and the business model may provide as values to you? *Why or why not?* | |
| | Would you prefer CLD applications to provide more environmental solutions in their services? If so, would you use/create/regulate it for that reason?<br>*Such as zero emission delivery (bicycle and other transportation modes found in the literature)* | |
| Extra if needed | Would the fact that an application does not provide environmental solutions and options prevent you from using or switching to it?<br>What factors do you think affect environmental sustainability of CLD or the business models?<br>Do you think the current implementation of CLD is meeting sustainability targets? Why or why not? | |

| RQ3 and Potential follow-up questions<br>Factors influencing CLD- all stakeholders | |
|---|---|
| Interview Questions | Purpose of the questions and notes |
| Can you tell me about any difficulties you faced before CLD? | To compare the barriers in the past before CLD and how CLD solved them. |
| Can you tell me about the difficulties you faced using CLD? If you faced any.<br>*Follow up questions:*<br>*Do any of these difficulties prevent you from using it? If so, why?* | Barriers in CLD in general. |
| What are the barriers in LSPs that are not in CLD?<br>*This question depends on the Business model the individual uses - could be traditional deliveries.* | Here to confirm or help the interviewees to mention the barriers that they have not mentioned in response to the previous questions, in case the interviewees missed anything. |
| *Potential follow-up: Factors from LM and CLD literature to cover:*<br>*Price*<br>*Quality*<br>*Leading time*<br>*Social: trust, security…* | Here is economic specific and other areas.<br><br>*Ask the interviewee their opinion about the role of these factors on barriers.* |
| How do you describe the barriers your application faces in general? | |

| | |
|---|---|
| What barriers do you think affect the CLD? | |
| Can you explain how these barriers affect CLD and your business model application specifically? | |

Table 1

| Year | Title | Check column | First cycle coding | Note | Second screening and cycle coding | Third codes cycle | Sub-themes | Themes | Gaps or notes |
|---|---|---|---|---|---|---|---|---|---|
| 1996 | Delivering alternatives: Successes and failures of home delivery services for food shopping | done | Service quality and customers' demands, cost in relation to minimising the car usage to shop for food. success and failures to meet customers loyalty.<br><br>Providing scheme to reduce customers car usage and improve food/grocery home delivery. | | Environmental and economic challenges | Challenges | Service quality and customers' demands | Complexity | Due to it is early stage before the internet empire, there is high number of gaps, such as lack of social and stakeholders understanding, definitions, stakeholders identifications, policies and so on. |
| 1999 | Applying GIS and OR techniques to solve Sears technician-dispatching and home-delivery problems | done | Routing and optimisation | | Optimisation challenges | Challenges | **Optimisation** | Solutions | |
| 2000 | Distribution systems for electronic commerce | done | Discussing the distribution system reliability to use in e-market place . | Conference Paper | Different ways of delivering | Planning | HD as a beneficial solution | | |
| 2001 | Winning the Last Mile of E-Commerce | done | Providing strategies for a successful last mile delivery(logistics) achievement | | Planning | Planning | e-commerce Challenges | | |
| 2001 | Physical distribution considerations for electronic grocery shopping | done | Cost efficiency for e- grocery home delivery. a model to switch from traditional deliveries to e-grocery delivery | | Cost efficiency | Solution | HD as a beneficial solution | | |
| 2001 | A bayesian approach to service level performance monitoring in supplier, provider relationships | done | Using statistics approach (Bayesian) to monitor Performance for virtual retailer and LSP. | Hypotheses testing | Parameters for performance monitoring/ efficiency | Efficiency challenge | Cost and efficiency | | |

## ***Interviewees list:***

| | Stakeholders involved and used of their quotations | | | | |
|---|---|---|---|---|---|
| **Interviewees' abbreviations** | Interviewees' stakeholder group | **Interviewees' position** | Business Model the stakeholder belongs to | | |
| | | | (B-to-B) | (B-to-C) | (C-to-C) |
| HD | Industrial | Application Owner | √ | | |
| BS | Industrial | Application Owner | | √ | |
| LA | Industrial | Application Owner | | | √ |
| FE | Industrial | Application Owner | | √ | |
| WF | Industrial | Local LSP Manager | √ | | |

| | | | | | |
|---|---|---|---|---|---|
| RA | Industrial | Int. LSP Regional Manager | √ | | |
| DMJ | Industrial | Local LSP Vice-President (VP) | √ | | |
| YL | Industrial | Restaurant Owner | | √ | |
| TF | Industrial | Restaurant Owner | | √ | |
| ZH | Institutional | Decision Maker in Addressing infrastructure | √ | √ | √ |
| ZF | Institutional | High Level Decision Maker in regulations and laws | √ | √ | √ |
| SR | Institutional | High Level Decision Maker in The Public Transport Authority | √ | √ | √ |
| IJ | Institutional | High level Decision Maker in strategies and planning | √ | √ | √ |
| SB | Institutional | High Level Decision Maker in National Address | √ | √ | √ |
| MHS | Individual | Driver | √ (B2) | | |
| ATS | Individual | Driver | | √ | |
| ZIY | Individual | Driver | | √ | |
| IND | Individual | Driver | | | √ |
| ASL | Individual | Driver | | | √ |
| MHF | Individual | Driver | | | √ |
| BGT | Individual | Driver | | | √ |
| QH | Individual | Driver | | √ | |
| YSA | Individual | Driver | √ (B2) | | |
| ABS | Individual | Customer | | | √ |
| HG | Individual | Customer | | | √ |
| MAL | Individual | Customer | | √ | √ |
| DGN | Individual | Customer | | √ | |
| SMN | Individual | Customer | | √ | |
| RAJ | Individual | Customer | | | √ |

| | | | | | |
|---|---|---|---|---|---|
| ADL | Individual | Customer | | | √ |
| UF2 | Individual | Customer | | √ | √ |
| FMG | Individual | Customer | | √ | |
| QR | Individual | Customer | | √ | √ |
| NW | Individual | Customer | | √ | |
| KM | Individual | Customer | | | √ |
| UF1 | Individual | Customer | | | √ |
| ED | Individual | Customer | | | √ |