Crowdshipping:
An exploratory research into its potential in urban areas in The Netherlands

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by

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Student number: 5293502

To be defended in public on July 13, 2022

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F.M. Verwijs

to obtain the degree of Master of Science

in Complex Systems Engineering and Management (CoSEM)
Faculty of Technology, Policy and Management

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Preface

Ever since finishing my bachelor's thesis, I have been dreading my master's thesis. The reason was that I could not imagine working on such a large project for a long amount of time. Previous individual projects have felt like short sprints with overseeable deadlines, and group projects were like a relay race where we could support each other. Similarly, I wanted to approach the thesis like a marathon (which, for the record, I have never done before). I put in every available hour of the day, working as much as I could. Some roads were easy, some were definitely harder.

My supervisors were there for training and support. I want to especially thank Jan Anne Annema for pointing out the weak points in my story line and for his positive mindset. I want to thank Bert van Wee for the detailed feedback on the societal impacts and SFF diagrams and for the brainstorm session we had back in November about interesting thesis topics. I want to thank Mark de Bruijne for his expert view on the stakeholder analysis and for triggering my creativity to find a suitable and accurate method.

My family and friends from Groningen were supporters on the sideline. I want to thank you for the mental support and distracting me whenever needed. My friends in Delft were running their own thesis marathon alongside me, and I want to thank you for the motivating lunch and coffee breaks at TPM.

Looking back, I must say I enjoyed the past five months much more than I had expected. I feel like I am ending with a runner's high because I am proud of what I have achieved. Now, onto the next challenge!

F.M. Verwijs
Delft, June 2022

Summary

Last-mile delivery in urban areas causes many **problems**, including air pollution, nuisance, and congestion. There are various delivery methods such as home deliveries with delivery vans, pick-up points, or delivery drones. These methods differ in terms of costs, sustainability impacts, and societal impacts. One of these methods is crowdshipping. An altered definition of crowdshipping by Buldeo Rai et al. (2017, p. 1) is followed: *an information connectivity enabled marketplace concept that matches supply and demand for logistics services with an undefined and external crowd consisting of amateurs, that has free capacity with regards to time and/or space, participates on a voluntary basis and is compensated accordingly*. According to literature, crowdshipping is a promising solution to various last-mile delivery problems, because it promises social (less nuisance), economic (cheaper delivery), and environmental benefits (less fuel consumption). Thus, it is able to answer growing wishes and demands of customers for faster, more personal, and cheap delivery services. In order to investigate whether crowdshipping is a delivery method that can be implemented in urban areas in the Netherlands, the success and failure factors (SFFs) need to be researched. This thesis aims to fill this knowledge gap by answering the **main research question**: *What are the success and failure factors of crowdshipping in urban areas in the Netherlands, and what implications do they have for future implementation?*. A literature review showed that the SFFs of this innovation are hardly researched.

To answer the main research question, five analyses have been performed. The results of the first four analyses and their implications for the SFFs are integrated in the last analysis. First, it is necessary to know the historical backdrop and state-of-the-art of crowdshipping. For this reason, **literature research into crowdshipping** has been conducted. The methodology was to search for academic articles in Scopus and apply backward and forward snowballing. It appeared that existing research has mainly focused on routing-and-matching optimisation or behavioural aspects through preference surveys or choice models. Furthermore, several companies have tried to implement crowdshipping, but most of them have failed. The implementations of crowdshipping differ in terms of e.g. market and commodity (business-to-business or peer-to-peer) or revenue model. Other important aspects are distance range (urban, interurban, or global) and the type of couriers (travellers or dedicated couriers). This thesis focuses on urban areas in the Netherlands. It was selected because delivery in this area causes many problems and costs and it has not been researched yet. Two main manners of crowdshipping are distinguished, namely *value-driven crowdshipping* and *profit-driven crowdshipping*. In value-driven crowdshipping, travellers deliver the package on their way to their prescheduled destination. This manner is called *value-driven crowdshipping* because it departs from values such as sustainability and community-spirit. In profit-driven crowdshipping, dedicated drivers make a new trip, especially for crowdshipping. This manner is called *profit-driven crowdshipping* because it departs from the profit that can be made. Thus, the main difference between the two manners is the selection of couriers.

Second, based on the two manners that were distinguished in the previous analysis, a **societal impacts analysis** was performed to determine whether implementation is desired on a societal level. It is assumed that crowdshipping was successfully implemented in a niche, existing besides current delivery methods. Based on literature research, the societal impacts were compared to the existing situation. The societal impacts diagram was constructed based on the framework by Van Wee et al. (2013). They present a conceptual framework of factors having an impact on transport volumes and the impact of the transport system on accessibility, the environment and safety. The analysis and diagram showed that the crowdshipping manner highly affects whether the societal impacts will be positive or negative. Value-driven crowdshipping will have positive societal impacts. Namely, there will be less delivery vans and lower delivery costs due to less fuel consumption. This positively impacts the environment and liveability. On the other hand, profit-driven crowdshipping will have negative societal impacts. Namely, it will lead to less efficient delivery because packages are not consolidated and a trip is made especially for one package. This has a negative impact on resources, the environment, and

liveability.

Third, the previous analysis showed that the selection of couriers is decisive for the societal im-pacts. Therefore, it is important to gain more insight into the couriers' power, interests, motivations, and problems. The customers, platform, and local government were included as well because the various stakeholders influence each other. The **stakeholder analysis** was performed according to the methodology by Bryson (2004). First, the "power-interest grid" showed that the courier's main in-terest is extra income in case of profit-driven crowdshipping. In case of value-driven crowdshipping, their main interests are environmental and community benefits. The courier's power is high because they form the supply. The biggest problems between couriers and customers are trust and safety issues. Second, the "bases of power - directions of interest diagram" showed that couriers are inter-ested in gaining extra income through delivery with flexibility in case of profit-driven crowdshipping. In value-driven crowdshipping, it is specified that this delivery must be environmentally-friendly. Third, the "stakeholder support vs. opposition grids" showed that value-driven crowdshipping receives more support and user acceptance than profit-driven crowdshipping.

Fourth, the societal impacts diagram and stakeholder analysis showed that value-driven crowd-shipping with travellers has most positive societal impacts and may receive most support. This was concluded based on literature study. This fourth analysis aims to deepen the knowledge of value-driven crowdshipping with travellers by applying a participatory method rather than literature study. The goal of the fourth analysis is to determine the attitude of potential courier target groups towards value-driven crowdshipping. It was done by conducting three **focus groups** according to the methodologies of Fox (2009), Myers and Newman (2007) and Longhurst (2003, pp. 143–153). Literature showed that uni-versity students and full-time employees are potential courier target groups. Although literature was very optimistic about their user acceptance, the results from the focus groups showed that their attitude towards participation is negative. The user acceptance is low because they do not want to invest time and effort, and they lose their flexibility. Moreover, they are worried about liability and security issues, indicating a lack of trust.

Fifth, in the **SFF framework construction**, the results of the previous analyses and their implica-tions for the SFFs are integrated. Namely, the literature review into crowdshipping identified the two manners that differ in terms of courier selection. This implied that there should be two SFF diagrams. The societal impacts analysis showed that value-driven crowdshipping has predominantly positive im-pacts, whereas profit-driven crowdshipping has negative impacts. This implied that the positive impacts (e.g. environmental benefits) could be a motivation for couriers and customers and therefore a suc-cess factor. The stakeholder analysis showed that customers are the most powerful and influential stakeholder. This implied that keeping customers happy is an SFF. The focus groups showed that the attitude of participants from potential courier target groups is negative. This implied that keeping couriers happy is also an SFF.

Based on Daniel (1961), Feitelson and Salomon (2004), and the Cambridge Dictionary, SFF was defined as "*a fact or situation that must be of a satisfactory level for the innovation to become a suc-cess*". An SFF that has met the satisfactory level is a success factor, otherwise it is a failure factor. A comprehensive view of crowdshipping implementation is given by showing the **SFFs in a framework** in Figure 1 on the next page. This framework shows the SFFs for both value-driven and profit-driven crowdshipping. Departing from the general framework, two separate frameworks were constructed with the application of the two manners. The general framework was constructed based on the political economy framework of transport innovations by Feitelson and Salomon (2004) and the framework on the dynamic multi-level perspective on technological transitions by Geels (2002). It was complemented with frameworks from Andersen and Markard (2020), Belassi and Tukel (1996), Emerson et al. (2012), Frambach and Schillewaert (2002), and Venkatesh et al. (2003). Moreover, findings from literature, semi-structured interviews, and focus groups were added. The main outtake of the framework is that the factors affecting *trust and user acceptance* are the most important factors that should be improved for crowdshipping to work. *Happy crowd* is crucial because this factor was seen in all previous analy-ses. The way to obtain the happy crowd differs for value-driven or profit-driven crowdshipping. Linked to this, *critical mass of couriers* is highly important because this affects the effectiveness. Finally, the

manner in which crowdshipping is implemented (value-driven or profit-driven) influences the *environmental benefits*. This impacts the *perceived effectiveness* and *customer experience*, which in turn affect *trust and user acceptance*.

The **main research question** can thus be answered as follows. Figure 1 shows that the SFFs can be divided into three steps, which are *technological niche; trust and user acceptance;* and *institutional feasibility*. From these three steps, *trust and user acceptance* appeared most important. *User acceptance* is important because a critical mass of couriers needs to be attracted. Relevant factors connected to this are *happy crowd*, *effort expectancy*, *perceived effectiveness* and *environmental benefits*. All other analyses (societal impacts, stakeholder analysis, and focus groups) showed that couriers want to put in as little effort and time as possible. To overcome the *user acceptance* failure factor, more research is necessary into how courier efforts can be minimised. Additionally, routing and matching and adequate selection of couriers help increase *perceived effectiveness* and *environmental benefits*. *Trust* is important because customers need to trust the courier to deliver their package safely, whereas couriers need to trust customers not to send hazardous or illegal items. Relevant factors connected to this are *safety and privacy* and *customer and courier communication*. The SFFs imply that *trust and user acceptance* is currently a failure factor that must be overcome. Involvement of local governments might help increase legitimacy.

The following **conclusion** is drawn from this research. If crowdshipping is to be implemented, the *value-driven* manner is recommended because this yields positive societal impacts. Therefore, the couriers are travellers instead of dedicated couriers. However, crowdshipping implementation in urban areas in the Netherlands has significant failure factors. Involvement of local governments and more research into minimisation of courier efforts are necessary to overcome these. However, it is unsure whether these failure factors can be readily overcome. Therefore, it is debatable whether crowdshipping is the most desired solution to resolve urban delivery problems. Future research should focus on investigating how the trust and user acceptance failure factor could be overcome.
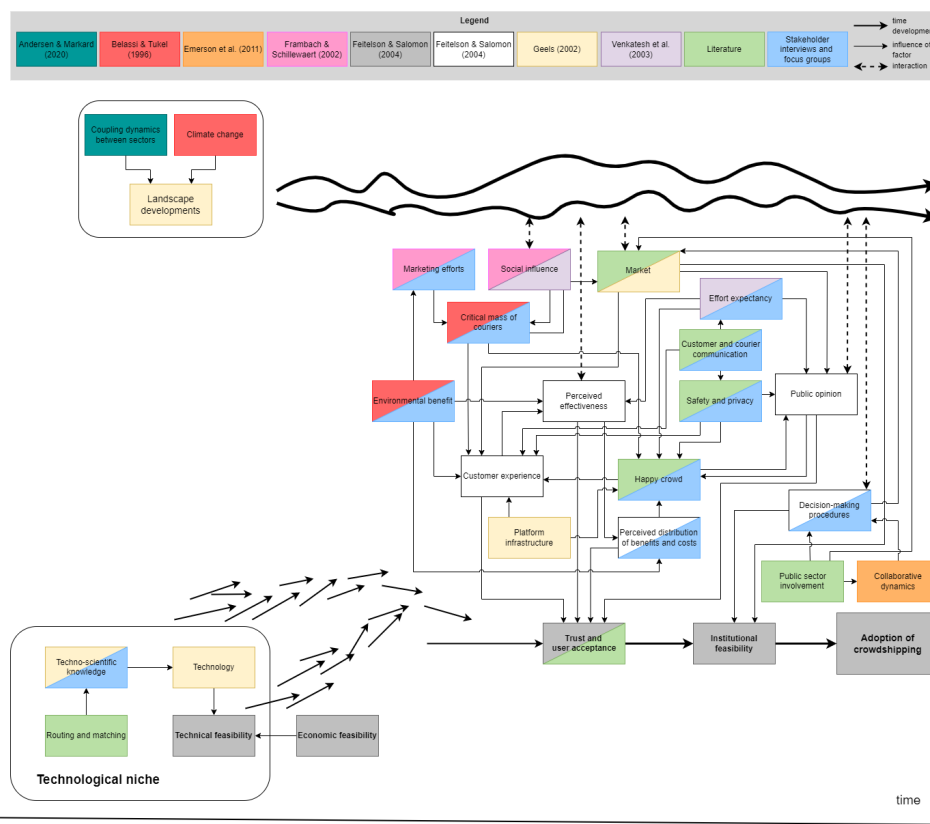

Figure 1: SFF framework constructed specifically for crowdshipping

Contents

List of Abbreviations

B2C	business-to-customer
CS	crowdshipping
LM	last mile
LSP	logistics service provider
P2P	peer-to-peer
PI	power interest
RFD	research flow diagram
RQ	research question
SFF	success and failure factor
SQ	sub question
TT	technological transition
UFT	urban freight transport

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1

Introduction

This Chapter provides an introduction to this thesis by stating the problem background, knowledge gaps, key concepts, and scope. It concludes by stating the relevance for the CoSEM programme and the structure of the report.

The distribution of goods in urban areas has been thoroughly researched in literature, endorsing its essential character and stressing sustainability issues. It is considered essential because goods are not consumed at the production location, which is especially the case in cities (Buldeo Rai et al., 2017). The rise of e-commerce in B2C sales causes an increase in demand for home deliveries (Taniguchi et al., 2016). City logistics are highly affected by e-commerce because most e-commerce customers live in urban areas (Mucowska, 2021). Urban freight transport causes many problems. Sustainability issues include fossil fuel consumption, greenhouse gas emissions, and air pollution (Buldeo Rai et al., 2017). Various European cities aim at emission-free city logistics by 2030 (Macharis & Kin, 2017; Melo & Baptista, 2017). Furthermore, a rise of 21% by the year 2030 is expected in city congestion due to last-mile deliveries (Mucowska, 2021). Besides sustainability issues, there is an negative impact on society, e.g. through noise, road safety, and traffic congestion (Buldeo Rai et al., 2017; Van Wee et al., 2004). Last mile delivery has been identified as most problematic part in terms of cost, efficiency, and pollution (Gevaers et al., 2014).

Crowdshipping may help resolve these problems (Buldeo Rai et al., 2017; Rougès & Montreuil, 2014). It is presented as a promising solution in which it encourages passengers to use their spare capacity regarding time and space on cars, bicycles, and public transport to transport parcels for others (Buldeo Rai et al., 2017; Rougès & Montreuil, 2014). The key is to optimise already existing trips (Giuffrida et al., 2021). Crowdshipping promises social, economic, and environmental benefits (Le et al., 2019) as an answer to the growing wishes and demands of customers for faster, more personal, and cheap delivery services (Rifkin, 2014). However, no comprehensive literature about the success and failure factors of crowdshipping can be found on Scopus. Some articles identify a small number of factors (e.g. Buldeo Rai et al. (2017), Mladenow et al. (2016), and Rougès and Montreuil (2014), see Chapter 3 Literature Review), but there is no complete overview. This thesis aims to fill this gap.

An altered definition of **crowdshipping** by Buldeo Rai et al. (2017, p. 1) will be followed: *"an information connectivity enabled marketplace concept that matches supply and demand for logistics services with an undefined and external crowd consisting of amateurs, that has free capacity with regards to time and/or space, participates on a voluntary basis and is compensated accordingly"*. The biggest difference between crowdshipping and traditional LSPs thus regards the utilisation of amateur couriers rather than professionals.

Three main actors can be considered: couriers, customers, and the platform. First, the supply is formed by **couriers**. Literature refers to them as couriers, drivers, driver-partners, or shippers. In this thesis, they will be called couriers. These customers are defined by Triki (2021, p. 1) as *"anyone willing to use his vehicle to deliver customers' orders - on their way to their prescheduled destination - and is willing to perform one or more deliveries to achieve a small business opportunity"*. If the courier is not on their way to their prescheduled destination, they will be called *dedicated couriers*. Second, the demand is formed by **customers**. Literature refers to them as customers or senders. These couriers

are defined by Le et al. (2019) as *"actors who request to send the shipment via crowdshipping"*. Third, the operations and management side can be covered by a company, an organisation, or a local government. Whichever party is involved, the use of a platform is necessary. For this reason, the operations and management side will be called the **platform**, as it is able to match the couriers and the customers. Platforms can have many features, which will be shown in Chapter 4. Le et al. (2019) defines it as *"a common platform where senders can announce their need for shipping freight and receive offers from system couriers"*.

This thesis considers crowdshipping as last-mile delivery method in the Netherlands. For considering the Netherlands as the geographical area, the reasons are threefold: crowdshipping in the Netherlands is not yet widespread; there are opportunities for implementation; and the author of this thesis is located in the Netherlands, which aids adequate assessment and contact with stakeholders. Additionally, there is much literature available on last-mile delivery, although not in the Netherlands. This provides a good basis for this thesis.

1.1. Research Question and sub questions
The main Research Question, based on the problem background and scope, is as follows:

What are the success and failure factors of crowdshipping in urban areas in the Netherlands, and what implications do they have for future implementation?

The RQ is derived from the knowledge gaps as follows. Firstly, it was identified that crowdshipping is a promising delivery method that requires more research. This thesis focuses on identifying the success and failure factors, and with that, the failure factors of implementation and to what extent they could be overcome. Then, "urban areas in the Netherlands" are selected because urban areas match with last mile delivery, and detailed case studies about the Netherlands have not yet appeared in literature. Finally, the sustainability criteria and societal impacts of crowdshipping will be elaborated on in sub research questions.

Then, based on this RQ, three sub questions are defined:

1. What are the state-of-the-art and societal impacts of crowdshipping?

2. What are the success and failure factors of crowdshipping?

3. Based on the answer to the main question: What recommendations can be made for implementation of crowdshipping in urban areas in the Netherlands?

1.2. Research approach and method
The research approach is selected based on the nature of the research question and information required to answer this question. The knowledge gap found is the substantial lack of theory on the failure factors of crowdshipping in the defined scope. This matches with the following statement: "if a concept needs to be understood because little research has been done on it, then it merits a qualitative approach" (Creswell, 2009). Furthermore, within the qualitative approach, the research is classified as exploratory / (semi-) inductive. As the research question aims to assess the potential based on SFFs, it is clear that it helps understand the problem, rather than offer solutions. This fits with the characteristics defined by Dudovskiy (n.d.). Additionally, exploratory research has large influences of participatory research due to the interviews and focus groups (Longhurst, 2003, pp. 143 – 153). The methods and data collection procedures will be explained in more detail in Chapter 2.

The main advantages and disadvantages of exploratory research are as follows. First, Dudovskiy (n.d.) states that it provides flexibility and adaptability to change. This is an advantage because the lack of research into crowdshipping requires flexibility. Conversely, the disadvantages include its subjectivity to bias, and the involvement of a low number of participants who may not necessarily adequately represent the entire group of stakeholders (Dudovskiy, n.d.). This disadvantage will be circumvented by selecting representative stakeholders and target groups, and the fact that there is only a limited

number of stakeholders in the Netherlands who are knowledgeable about the topic. All advantages and disadvantages will be explained in more detail in Chapter 2.

1.3. CoSEM relevance

The relation between the thesis and the CoSEM study programme is as follows. First, it becomes clear that the described problems occur in the temporal and social context of the environmental impact in the field of transportation. The investigated system is multidisciplinary: it involves a combination of technology, societal (environmental) impacts, governance, laws, and regulations. The system is considered complex due to the involvement of many stakeholders and evaluation criteria and the unpredictability of the system. The scientific added value of the thesis will be in the theoretical framework containing success and failure factors, the societal impacts diagram, and implications for theory. These are the result of a reflection on literature, stakeholder opinions in the form of interviews, opinions of participants of the focus groups, and the formation of a judgement by the author of this thesis. The communication and cooperation will be in the form of the written report. Lastly, the intervention is visible in the recommendation that can be used for any party that is interested in crowdshipping, whether it be private companies or public institutions.

1.4. Report structure

The report is structured as follows. This Chapter has briefly introduced the problem and research questions, including knowledge gaps, key concepts and scope. Next, Chapter 2 shows which methodologies will be used to perform the analyses. Then, Chapter 3 shows the literature review into last-mile delivery methods, and provides the problem statement related to crowdshipping. Then, the results of these analyses will each be elaborated on in a separate Chapter. Namely, Chapter 4 provides the literature review into crowdshipping. Chapter 5 shows the societal impacts diagram. Next, Chapter 6 shows the stakeholder analysis. Chapter 7 explains the focus groups. Then, based on all previous analyses, in Chapter 8, the SFF framework is established and discussed. After the analysis chapters, Chapter 9 discusses the results. Finally, Chapter 10 provides an answer to the main question, conclusions, and recommendations for future research.

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Methodology

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This Chapter describes the methodologies that were followed to perform the analyses in the subsequent chapters. It starts with a presentation and discussion of the Research Flow Diagram. Then, in more detail, the methodologies of the analyses are explained in order of appearance in this thesis.

2.1. Research Flow Diagram

The Research Flow Diagram (RFD) is presented in Figure 2.1. The steps in the RFD will be explained in more detail by discussing for each analysis the goals, approach, and rationale.

The legend of the RFD explains the symbols used. The black dot depicts the main RQ or SQ that was answered in each step. Then, there are three research methods. The person depicts analysis or reasoning. The pile of books depicts literature study. The speech bubbles depict interviews and focus groups. Next, the arrows represent the output/input flow between research methods, and the orange dotted lines indicate the start of a new Chapter in the thesis. It must be noted that Chapter 3 is lacking because this is the Methodology Chapter. Finally, the large orange arrow indicates that each research step will further scope and specify the direction in which crowdshipping can be implemented in urban areas in the Netherlands.

The Research Flow Diagram should be read as follows. The research starts with an *Introduction* to the topic in Chapter 1. This is done through literature study and analysis to determine the scope. The output of this step is the problem background, key concepts, and scope. This is the input for the subsequent step, namely *Literature review into last-mile delivery methods* in Chapter 2. This corresponds to SQ1 and is done through literature study. The output of this step is the state-of-the-art and historical background of last mile delivery, knowledge gaps, and formulation of the main RQ. This output forms the input of the *Analysis* step, which is divided into five parts. The first analysis step regards the *Literature review* in Chapter 4. This corresponds to SQ1 and is done through literature study and analysis. The output of this step is the state-of-the-art and historical background of CS. This may appear similar to the previous step, Literature review into last-mile delivery methods. However, the previous step focused on last mile delivery in general, whereas the current step zooms in on crowdshipping specifically. The output of the first Analysis step is the input for the next Analysis step, namely *Societal impacts* in Chapter 5. This corresponds to the first RQ. The societal impacts are input for *Stakeholder analysis* in Chapter 6. It corresponds to SQ2 and is again done through literature study and analysis. The output of this step is identification of stakeholder influences on potential implementation. This is the input for the next Chapter, namely *Focus groups* in Chapter 7. This corresponds to RQ2 and was done through literature study, analysis, and interviews. The output is people's attitude towards crowdshipping. This forms the input for the next Analysis step, namely the *SFF framework* and *Interviews* in Chapter 8. This corresponds to SQ2. It was done through literature study, analysis, and interviews. The output the fifth Analysis step is identification of success and failure factors. This provides the input for the next step, which is *Discussion* in Chapter 8. This corresponds to all research questions and was done through analysis. The output of this step is discussion of all analyses and an answer to the main RQ. It corresponds to all RQs. This provides the input for the final step, which is *Conclusion and recommendation* in Chapter 10. This corresponds to the main RQ and SQ3 and was done through analysis. The output of Conclusion and recommendation was an answer to the main RQ and recommendations for future research.
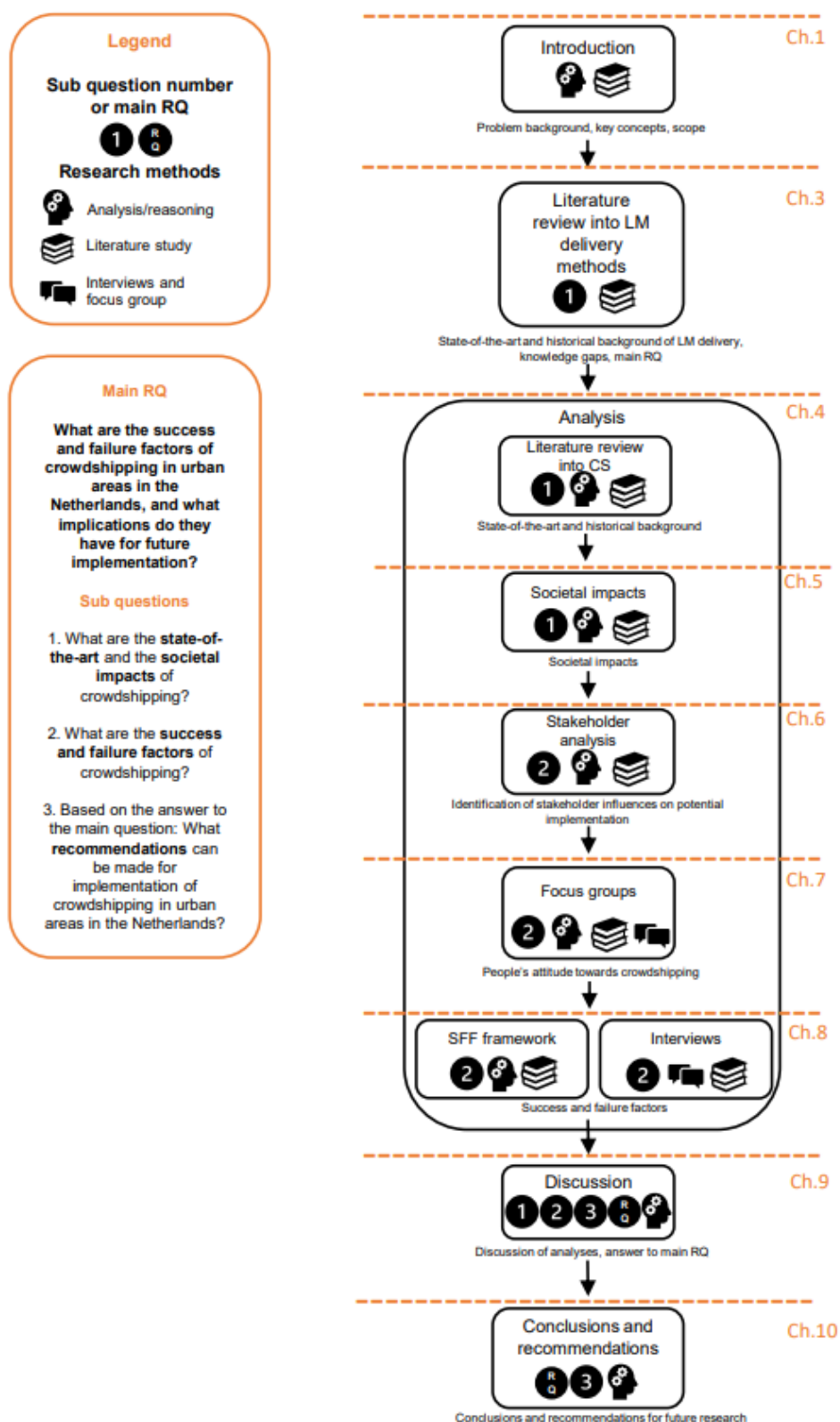
Figure 2.1: Research Flow Diagram, main RQ and sub questions

2.2. Literature review into crowdshipping

This section describes the methodology of the literature study by describing the goals, approach, rationale, advantages and disadvantages, and its influence on the results.

2.2.1. Goals
The goal of the literature study is to provide an introduction to this thesis by stating the problem background, knowledge gaps, key concepts, and scope in Chapter 1. Also, the goal is to provide the state-of-the-art in Chapter 4. The research question linked to the literature study was as follows: *What are the state-of-the-art and the societal impacts of crowdshipping?*

2.2.2. Approach
The broad definition of literature by Onwuegbuzie et al. (2010) was used: *research articles, opinion articles, essays, article reviews, monographs, dissertations, books, Internet websites, video, interview transcripts, encyclopedias, company reports, trade catalogues, government documents, congressional/parliamentary bills, popular magazines, and advertisements* (p. 173). As shown in Figure 2.1, literature study was conducted for various purposes, namely the theoretical background and problem statement of LM delivery; the state-of-the-art and societal impacts of CS; the stakeholder analysis; the SFF framework; and the focus groups. The considered articles can be found in Table A.2 in the Appendix. The approach will now be explained per purpose. Additionally, the general approach for processing all literature obtained will be explained.

First, for the **literature review into last-mile delivery methods**, the literature study into last mile delivery was conducted as follows. Firstly, the terms "innovation AND framework AND transport AND green AND sustainable* AND urban AND e-commerce" were searched for in Scopus. This yielded four results, of which three were considered useful. The usefulness of the articles depended on the criteria of conference papers, non-articles, or inaccessible articles, or focused on only one delivery method and its implementation. Although the latter is useful in later stadiums of the Master Thesis Project, currently, the focus is on a generic overview of delivery methods. Additionally, it must be noted that the number of articles found was very low due to the restrictive use of keywords. Therefore, the keywords searched for were widened to "innovation AND transport AND green AND sustainable* AND last mile". This yielded four results, of which two were the exact same article, one was already found, and one was not useful. Thus, one additional article was found. Again, the results were rather limited due to restrictive use of keywords. Therefore, backward snowballing yielded 10 additional articles. This resulted in 14 articles in total. Table A.1 in the Appendix provides an overview of the considered articles.

Second, the literature study into the **state-of-the-art and societal impacts of CS** was conducted as follows. First, the terms "(crowdshipping OR crowdsourcing) AND urban" were searched for in Scopus. This yielded 961 results, which were sorted from high to low citation. It appeared that many of these articles did not match the scope of this thesis because they either focused on data-aspects of crowdshipping; were inaccessible; or were not related to urban LM transport. 11 of these articles were considered useful. Snowballing led to 14 additional articles. Furthermore, in the repository of TU Delft [1], two theses on crowdshipping were found. Lastly, based on an article about sharing economy, recommended by Mr. Annema, two additional articles on this topic were found through snowballing. Table A.2 in the Appendix provides an overview of the considered articles.

Third, the literature study to prepare the **stakeholder analysis** is based on the same documents as for the theoretical background and problem statement, and state-of-the-art and societal impacts of CS. Special attention was paid to the articles that considered a case study. Additionally, the book "Management in Networks" by De Bruijn and Ten Heuvelhof (2018) provided additional information about the multi-issue approach.

Fourth, the literature study into the **SFF framework** was done as follows. The starting point were the articles by Feitelson and Salomon (2004) and Geels (2002) because they had been elaborately covered in the SEN1741 course. Additionally, the articles by Hekkert et al. (2007), Van der Panne et al. (2003), and Wieczorek and Hekkert (2012) were used for forward and backward snowballing. Articles were selected based on the applicability to crowdshipping, the type of framework (conceptual model, table, etc.), and the number of citations. This resulted in approximately 10 frameworks, of which 5 were used in constructing the framework in Chapter 8.

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[1]www.repository.tudelft.nl

Fifth, the literature study to prepare the **focus groups** is based on the same documents as for the literature review, and state-of-the-art and societal impacts of CS. Special attention was paid to the articles that considered qualitative methods involving participants.

Finally, the manner of **processing all obtained literature** was as follows. An Excel file was created that contained the following columns: *Title, Authors, Year, Journal, RQ/goal, Methodology, Results, Limitations, Future research, Remarks, Background, Definitions, Concepts, Specifications of CS, Societal impacts, Success factors, Barriers, Growth, Stakeholders - couriers (= supply), Stakeholders - customers (= demand), Stakeholders - company/intermediary (= platform & operation), Target group (crowd), Framework, Legal, Geographical area, Empirical material, Experiment.* It can be seen that this corresponds to the directions of interest of this thesis. In each cell (row/column combination), the contribution of the article towards the corresponding column was stated. Additionally, the colour of that cell indicates if an article is exceptionally useful (green), or if the article focuses on a case study (blue). Then, vertically going through the contributions of the articles, a synthesis was made to obtain insight in similarities or differences between articles, knowledge gaps, and other focus areas.

2.2.3. Rationale
The rationale of conducting a literature study to (partly) answer the sub questions and the main question is twofold. First, it distinguishes what has been researched and what knowledge gaps exist, avoiding unintentional and unnecessary replication. Moreover, it identifies potential contradictions or inconsistencies. Additionally, it identifies variables relevant to the topic (Onwuegbuzie et al., 2010). Second, it matches well with the CoSEM thesis objectives and skills acquired. Thus, it is considered an adequate method.

Furthermore, the rationale for using the broad definition of literature by Onwuegbuzie et al. (2010) is that usually, grey literature is faster than academic literature in describing novelties. This is desired because crowdshipping is a relatively new innovation that is rapidly evolving.

2.2.4. Advantages and disadvantages
The main advantages of literature research are *representation* and *legitimisation* (Leech & Onwuegbuzie, 2010). They state that literature research enables to extract meaning from multiple sources, and the synthesis ensures generating more meaning and quality. Legitimisation, on the other hand, refers to the ability of literature research to improve credibility and dependability through syntheses. However, there are disadvantages as well. The first disadvantage is that the quality of the literature study decreases due to time constraints, as not everything can be read. Additionally, due to the lack of time and resources, it is difficult to evaluate the quality of the articles (Leech & Onwuegbuzie, 2010).

2.2.5. Influence on results
As the literature study provides a basis for the subsequent analyses, it has a profound influence on the results. For instance, the knowledge gap identified in literature provides the direction of interest for the stakeholder analysis, the SFFs, and the focus groups. Wrongly drawn conclusions in the literature study will lead to wrongly drawn conclusions for the subsequent analyses. Additionally, this decreases the legitimacy and usefulness of the thesis.

2.3. Societal impacts diagram
This section describes the methodology of constructing the societal impacts diagram by describing the goals, approach, rationale, advantages and disadvantages, and its influence on the results.

2.3.1. Goals
The goal of this chapter is to show the societal impacts of crowdshipping in a diagram to determine whether implementation is desirable. The research question linked to the societal impacts diagram was as follows: *What are the state-of-the-art and the societal impacts of crowdshipping?* Figure 2.1, it can be seen that the output of this research question was the input for the subsequent stakeholder analysis, as it helps specify the scope. For this reason, the implications for the subsequent analyses were provided as well.

Identification of the societal impacts is necessary to answer the main RQ for three reasons. First, it is important to know whether it is desirable for society to implement crowdshipping, before researching how it can be done. This is also necessary for identifying the scope. Second, the positive societal impacts can be a motivation for stakeholders to participate in crowdshipping. Stakeholder participation affects the success or failure of the innovation because without users, it cannot exist. Third, identification of the societal impacts determines which manner (value-driven or profit-driven) is most desirable. This influences the selection of couriers, and thereby other SFFs.

2.3.2. Approach
The societal impacts diagram was based on the diagram presented and discussed by Van Wee et al. (2013) in their book "The Transport System and Transport Policy: An introduction" on p.6. This diagram is a conceptual framework of factors having an impact on transport volumes and the impact of the transport system on accessibility, the environment and safety. The steps to be taken to tailor the diagram to crowdshipping, were as follows.

1. Analysing and assessing per factor from Van Wee et al. (2013, p.6), whether it is relevant and applicable to the case of crowdshipping and the scope of this thesis

2. Performing literature study according to Section 2.2 to determine which societal impacts are mentioned in literature

3. Integrating the relevant factors from Van Wee et al. (2013) with the impacts from literature

4. Describing the details of the impacts

2.3.3. Rationale
The conceptual framework by Van Wee et al. (2013) on p.6 was used as the starting point because it is is applied to the transport system, and coherently links effects on accessibility, the environment, safety, and policy. Furthermore, it considers the multidisciplinary aspects of the transport system. However, it must be noted that not all impacts described are relevant for the case of crowdshipping. Therefore, careful analysis and assessment are performed to present an accurate diagram.

Secondly, in assessing the framework by Van Wee et al. (2013) and performing literature, the scope of this thesis must be carefully considered. This is because crowdshipping implementation could go into many directions, but for further analyses, it is important to narrow these possible directions through each analysis. Especially restriction to urban areas is influential.

2.3.4. Advantages and disadvantages
The advantages and disadvantages of the approach described above are as follows. The advantages include that the framework by Van Wee et al. (2013) is easy to use as a starting point, well-explained, and relevant to the case of crowdshipping. However, the disadvantage of using the framework as a starting point is that it might steer into a predetermined direction and constrain out-of-the-box thinking.

2.3.5. Influence on results
As stated in Subsection 2.3.4, the disadvantage of using the framework by Van Wee et al. (2013) is that it might steer into a predetermined direction and constrain out-of-the-box thinking. This directly influences the results of the societal impacts diagram and analysis. Then, the literature study influences the results of the societal impacts diagram because not everything can be read and some impacts might remain unconsidered.

2.4. Stakeholder analysis
This section describes the methodology of the stakeholder analysis by describing the goals, approach, rationale, advantages and disadvantages, and its influence on the results.

2.4.1. Goals
The goal of the stakeholder analysis is to identify the stakeholders' interests and power, and how this influences the way in which crowdshipping could be implemented. The corresponding RQ is as follows: *What are the success and failure factors of crowdshipping?*

2.4.2. Approach
Based on the sub questions, the steps in the stakeholder analysis process are defined as follows.

1. Conducting literature study into the most suitable stakeholder analysis methodology

2. Conducting literature study into potential target groups (couriers and customers)

3. Performing a stakeholder analysis according to the selected methodology

4. Drawing conclusions and deciding what form of crowdshipping has potential for implementation

Regarding the first step, the starting point to find suitable stakeholder analysis methodology was the literature previously used. More literature on methods and techniques was found through identifying related literature and snowballing. Selection of literature was based on how it matches with this Chapter's goals. Regarding the second step, the goal was to identify which groups of couriers and customers would be interested in the supply and demand side of CS, respectively. Regarding the third step, the emphasis was placed on identifying the stakeholder's motivations for crowdshipping.

Now, the selected stakeholder analysis methodology is explained, which corresponds to step 3. In "What to do when stakeholders matter: A guide to stakeholder identification and analysis techniques", Bryson (2004) reviews the stakeholder concept in literature on public and nonprofit management. Furthermore, he reviews various stakeholder identification and analysis techniques, arguing which technique is appropriate in which situations. He identifies four categories of techniques, which are (1) problem or issue formulation; (2) proposal development, review and adoption; (3) policy or plan implementation, and (4) participation planning. Only the first two are considered useful for scope of this thesis, because the focus is on identifying the influence of stakeholders on crowdshipping implementation, and not the practicalities of implementation itself. Per category, one or two techniques were selected for this thesis. These categories and corresponding techniques are stated below.

1. Problem or issue formulation

   - PI grid, extended to a Stakeholder Influence Diagram
   - Bases of power - directions of interest diagram

2. Proposal development, review, and adoption

   - Stakeholder support vs. opposition grid

The explanation of each technique is as follows. First, the PI grid, extended to Stakeholder influence diagram, helps determine which players' interests and power bases *must* be taken into account in order to address the problem or issue at hand. Additionally, it indicates how the stakeholders on a PI grid influence each other. Second, the Bases of power - directions of interest diagram helps identify the stakeholder's powers that might affect achievement of the purposes of the crowdshipping implementation, and what the stakeholder's interests are in relation to the crowdshipping purposes. Additionally, the diagrams intend to provide background information on each stakeholder in order to know how to tap into their interests, or make use of their power, to advance the common good. Finally, the Stakeholder support vs. opposition grid focuses on specific proposals, rather than problem frames or definitions. It assesses these in terms of stakeholder support, opposition, and importance (Bryson, 2004).

2.4.3. Rationale
This paper by Bryson (2004) was taken as a basis for stakeholder methodology for five reasons. First, the described techniques are appropriate for situations with governmental involvement, and to assess and enhance political feasibility (Bryson, 2004). This matches very well with the scope of this thesis, as the literature study revealed that governmental involvement is crucial in overcoming the trust failure factors (Paloheimo et al., 2016; Van Wee et al., 2004). Second, Bryson (2004) highly relates stakeholder analysis to multi-issue problems and opportunities to pair multiple values when solving these problems. He categorises the techniques in four categories, of which "Review and adoption" and "Plan implementation" focus on involving and understanding stakeholder and their interests, both separately and in relation to each other. This matches well with the values that motivate couriers to participate

in value-driven crowdshipping. Third, Bryson (2004) allows to evaluate the stakeholders support or opposition towards proposals. This is useful to compare value-driven and profit-driven crowdshipping from a stakeholder perspective. This is an additional dimension compared to other types of stakeholder analyses. Fourth, all of these techniques and corresponding purposes are described in a very practical manner which allow for easy execution. Fifth, according to Google Scholar, this paper was cited by 2231 other papers. Therefore, it can be considered a reliable source to structure the stakeholder methodology.

From the variety of techniques proposed by Bryson (2004), the aforementioned ones were chosen for three reasons. First, these techniques match the goal of the stakeholder analysis, namely to identify potential directions of interest and involved stakeholders. Second, it gives insight in the power and interests of stakeholders, which matches the multi-issue approach. Third, the focus is on finding common ground across all stakeholder groups, which is necessary when multiple stakeholders are involved.

2.4.4. Advantages and disadvantages
The advantages of designing the stakeholder analysis as described above are as follows. First, it helps gain better understanding of the problem and specifying the possibilities for implementation. Second, it helps to gain support and information. Third, it enhances legitimacy, representation and credibility (Bryson, 2004). However, the main disadvantages is that it may lead to incorrectly drawn conclusions because the topic of interest does not yet exist.

2.4.5. Influence on results
In general, due to the advantages and rationale described before, it can be concluded that the stakeholder analysis helps gain better understanding of the stakeholders' power and interests regarding the problem, their opinion on the SFFs, and influence on the specification of crowdshipping implementation. However, the disadvantage points out that stakeholders have to express their opinion on something that does not yet exist, may lead to incorrect conclusions.

2.5. Focus groups
This section describes the methodology of the focus groups by describing the goals, approach, rationale, advantages and disadvantages, and its influence on the results.

2.5.1. Goals
The previous analyses were based on literature search. The goal of the current chapter is to deepen the knowledge of value-driven crowdshipping with travellers by applying a participatory method. Special focus is on travellers because the stakeholder analysis according to Bryson (2004) showed that couriers are an important and influential stakeholder group. The research question linked to the focus groups design was as follows: *What are the success and failure factors of crowdshipping?* It is answered through evaluating people's attitude towards crowdshipping in a focus group. This will lead to better understanding of how crowdshipping can be implemented.

2.5.2. Approach
Morgan (1996) defines a focus group as "a research technique that collects data through group interaction on a topic determined by the researcher". It takes place in an informal setting and participants have the opportunity to react to the topic in their own words, rather than e.g. yes/no answers or a Likert scale (Longhurst, 2003; Morgan & Hoffman, 2004). The moderator is the leader of the discussion, stimulating interaction between participants. They prepare questions that the focus group can discuss about. The moderator says as little as possible, seeking to get participants to give much input (Greenbaum, 1998). Greenbaum (1998) distinguishes various types of focus groups. In this thesis, the *telephone group* type was selected. In this type, the focus groups are conducted in a conference call. The average duration of a telephone focus group is 60 minutes. Finally, usually, participants are paid for their involvement (Greenbaum, 1998). However, for this thesis, participants were asked voluntarily. This matches well with the telephone focus group setting, as they do not have to travel to a central location.

The focus groups will aim at determining people's attitude towards crowdshipping. This entails crowdshipping in general, and when participating as a courier or customer. As the SFF analysis showed

that *happy crowd* is essential, special attention was paid to people's attitude towards participation as courier. Additionally, literature showed that potential courier target groups are university students (Giuffrida et al., 2021; Marcucci et al., 2017) and full-time employees (Punel et al., 2018). Therefore, these were the participants selected for the focus groups. Thus, these groups differ in schedule flexibility, income, and age.

The starting conditions were determined according to the framework by Bos et al. (2013). This framework delineates enabling starting conditions and features for designing and organising social learning situations. It is shown in Figure B.10. These starting conditions "guide the design and structure of an initiative and facilitate its legitimacy and execution" (Bos et al., 2013). There are three dimensions which are now discussed separately. First, the *shared learning agenda* aids in understanding what operational environment is needed during the focus group. It focuses on the values and learning goals. The learning goals are to determine attitudes towards crowdshipping of people from courier target groups identified in literature. The operational environment needed regards a determined date, time, and space to discuss prepared questions with a moderator. The values include knowledge generation (Fox, 2009; Greenbaum, 1998), discussion, and interaction (Morgan, Krueger, et al., 1993). Second, *legitimacy* focuses on the support to endorse and legitimise the focus groups. This is yet unclear because crowdshipping has not been implemented. Also, it is not entirely clear how it can be implemented. Open-ended questions are asked to stimulate discussion and to allow people to share a wide variety of opinions. Third, *resources* describe the resources to undertake the focus groups. No funding was necessary. Use was made of the resources that were already available, such as an online meeting space and recording devices (MS Teams).

Then, the design of the focus groups was done according to the five design issues raised by Morgan (1996). These are standardisation, sampling, number of groups, level of moderator involvement, and group size. They will now be explained. First, *standardisation* regards identical questions and procedures in every group. Every group was presented a short video (in Dutch) that explains crowdshipping. Additionally, the text with additional information was scripted. Next, the questions that the groups will discuss were prepared beforehand. The script and preparations can be found in Chapter D of the Appendix. Participants did not receive any information about the topic prior to the meeting. This was done to avoid them researching the topic before the meeting. As crowdshipping is rather unknown, it can be assumed that their background knowledge is none. Second, *sampling* was done based on employment status. The first group consisted of people who study full time, whereas the second group consisted of people who work full time, e.g. at least 36 hours per week. For obvious reasons, the first group contained younger participants. The second group contained a mix of younger and older participants. In both groups, a mix between genders was aimed for. However, each group contained participants of similar socioeconomic status, namely higher-educated. Participants were recruited through personal contact and social media. Third, the *number of groups* was three. For each target group, one focus group was organised. However, after the focus group with university students, it became clear that there was an unexpected negative attitude towards crowdshipping. This could be caused by a strong opinion of one of the participants, influencing the general group vibe. To validate this, a third focus group was organised. Fourth, the *level of moderator involvement* can be classified as "more structured". The moderator controls what topics are discussed and manages group dynamics. This is done because in a telephone group, it can be more difficult for discussions to evolve naturally. Fifth, the *group size* was approximately 8 per group. This is done to increase participant involvement. Each participant has sufficient time to discuss their view. Additionally, smaller groups are easier to moderate.

Finally, two table overviews were made of the focus group. All focus groups were conducted in Dutch. For this thesis, the findings were translated. The first table contains the participants' characteristics (e.g. name, age, education, main mode of transport, number of received packages/month) and voting results. Their ages are classified using the age groups defined by Rogers (2010). The second table contains group answers to the open questions. Both tables can be found in Chapter E in the Appendix. Then, all focus groups were discussed based on their group composition; their attitude towards urban last mile delivery in general; their attitude towards crowdshipping in general; their attitude towards crowdshipping as a customer; and their attitude towards crowdshipping as a courier. Finally, the focus groups were discussed separately and together.

2.5.3. Rationale

The reason to select focus groups is that they are recommended in research that focuses on exploring new fields, where little is known about the topic. They are effective means to gain relevant information about customer attitude towards the innovation. The telephone focus group type is selected because it is less time-consuming and costly than asking participants to travel to a central location. Additionally, it has organisational advantages such as that no rooms need to be booked (Greenbaum, 1998).

Second, the reasons to organise focus groups distinguishing between students and full-time employees are as follows. Literature often considered university students as a potential courier target group because of their flexibility and openness to innovations (e.g. Giuffrida et al. (2021), Marcucci et al. (2017), and Triki (2021)). However, other sources indicate that crowdshipping is more common among full-time employees (e.g. Punel et al. (2018)). The two focus groups will give clarity and information about which target group might be more promising.

2.5.4. Advantages and disadvantages

The advantages of using focus groups are that they match with the goal to generate knowledge, as little is known about the topic (Greenbaum, 1998). Also, it is an effective manner to generate multiple opinions at once. Discussion and interaction in the group yields better results than the sum of individual interviews (Morgan, Krueger, et al., 1993). Additionally, the telephone type has the advantage that the conference call provides a neutral and easily accessible setting, and participants do not have to travel. However, disadvantages include that there might be problems in "turn taking" in an online setting (Fox, 2009) or participants may be influenced by the opinion of others (Greenbaum, 1998). This influence on the group dynamics was clearly seen in focus groups 1 and 2. Additionally, the behaviour of the moderator highly influences the nature of the focus group (Morgan, 1996).

2.5.5. Influence on results

The biggest influence of the method on the results regards how one person's opinions affect the entire group dynamics. This was seen in focus group 1, and therefore, another focus group with the same target group was organised. The advantage of presenting the case by reading a text aloud is that the information is presented in the same manner to both focus groups and that it allows to describe the various aspects of the case. However, some participants might have difficulty thinking about and understanding the case in a short period of time. This impacts the results because the participants are not able to adequately assess and evaluate the crowdshipping.

2.6. Interviews

This section describes the methodology of the interviews by describing the goals, approach, rationale, advantages and disadvantages, and its influence on the results.

2.6.1. Goals

The goal of the interviews was to acquire stakeholders' opinions on the SFFs. The research question linked to the interviews was as follows: *What are the success and failure factors of crowdshipping?* To identify the SFFs, a literature study was conducted according to the method described in Section 2.2.

2.6.2. Approach

First, relevant stakeholder groups were identified through the stakeholder analysis in Chapter 6. Then, the specific knowledgeable people was contacted via Rodrigo Tapia, Postdoctoral Researcher in Freight & Logistics lab of the Faculty of Civil Engineering at TU Delft. Together with other parties, he works on the LEAD project [2] on urban cargo transport in the city of The Hague. Crowdshipping is one of the delivery methods that they consider. Three stakeholders were interviewed. These are a project manager involved in the LEAD project, an employee of a successful crowdshipping startup, and a policy advisor from the Municipality of The Hague.

The interview method used is a combination of three methods, namely by Fox (2009), Myers and Newman (2007), and Longhurst (2003, pp. 143–153). Longhurst (2003) defines semi-structured in-

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[2]www.leadproject.eu

terviews as follows: "A verbal interchange where one person, the interviewer, attempts to elicit information from another person by asking questions. Although the interviewer prepares a list of predetermined questions, semi-structured interviews unfold in a conversational manner offering participants the chance to explore issues they feel are important." They are conversational and informal in tone (pp. 143 – 153).

The steps to be undertaken were as follows, according to Longhurst (2003).

1. Formulating questions

   - Requires preparation, thought, and practice
   - There should be room for the interviewee to raise their own ideas, thoughts, and questions

2. Selecting and recruiting participants

3. Choosing a location

   - Ought to be conducted in a place where both participants and interviewer feel comfortable

4. Transcribing data

Longhurst (2003) adds a fifth step, namely "Considering potential ethical issues or power relations involved". The only relevant aspect of this step for this thesis is to ask interviewees whether they shared any confidential information. Additionally, if the interviewee wishes to receive the transcript, they were provided with this within 24 hours.

Question formulation is done according to the dramaturgical model of the qualitative interview by Myers and Newman (2007). These steps are as follows.

1. Preparing the opening - introducing yourself, etc.

2. Preparing the introduction - explaining the purpose of the interview

3. Preparing the key questions

4. Preparing the close - e.g. asking permission for a follow-up, or asking who else the interviewee recommends might be interviewed

Next, Fox (2009) provides recommendations regarding the interview skills. He emphasises the importance of reflective questioning, summarising and controlling the interview process. Additionally, he argues that the interviewer should be unbiased, systematic, thorough, well-prepared, non-judgemental, familiar with the topic, and a good listener (Krueger & Casey, 2000).

The practicalities of the interviews were as follows. All interviews were individual and online through MS Teams. The story line of the interviews was according to the model by Myers and Newman (2007) and consisted of four steps. First, participants were welcomed and thanked for their participation. It was asked whether participants allowed that the meeting be recorded and that the transcription be included in the Appendix of this thesis. Second, the goal of the thesis was explained. Third, general questions were asked. These questions can be found in Section C in the Appendix. These questions were asked with the goal to start the conversation, to find out what they know about crowdshipping, and what their view is on crowdshipping implementation. Besides general questions, specific questions were prepared based on the expertise and knowledge of the interviewee. These specific questions can be found in Section C.2 for the interview with Thomas Robers, in Section C.3 for the interview with Jackson Amankwah, and in Section C.4 for the interview with Sven Mittertreiner. The goal of these questions was to elicit information that could not be easily found in literature but is based on their practical experiences. All questions were open-ended and not in a specific order. Moreover, there was room for questions to emerge during the interview. This is according to the semi-structured interview style. Fourth, the interview was concluded by thanking the interviewee for their time, offering to send the transcription, and asking about potential confidentiality.

The data processing method was to create literal transcriptions. These transcriptions can be found in Chapter C in the Appendix. Based on the literal transcriptions, sentences were coded with how they contribute to identifications of the SFFs. Additionally, a general, impressionistic summary was made of each interview. The summaries had the following outline: general information about interviewee; their activities in crowdshipping; SFFs mentioned and why; additional information. The summaries can be found in Section C.2 for the interview with Thomas Robers, in Section C.3 for the interview with Jackson Amankwah, and in Section C.4 for the interview with Sven Mittertreiner. The transcription and summary were shared with the interviewees who requested this.

2.6.3. Rationale
Interviews are commonly used in exploratory studies (Fox, 2009). A semi-structured interview method was selected as it promotes a relaxed and informal atmosphere, in which the interviewee feels comfortable responding in their own words (Longhurst, 2003, pp. 143 – 153). Furthermore, it matches with the qualitative approach, where the research is exploratory and little is known about the subject area (Fox, 2009). The rationale to choose for individual interviews rather than group interviews or focus groups, is that different stories were shared regarding the same topic, and it is interesting to learn about the different perspectives (Fox, 2009).

The three methods were found through snowballing from academic articles with a similar focus as this thesis. Longhurst (2003) and Myers and Newman (2007) were selected because according to Google Scholar, they have been cited 2228 and 2820 times respectively, which makes them reliable sources. Fox (2009) was selected because it is a very practical guide and tailored to research projects.

Next, there are three reasons to recruit interviewees via Rodrigo Tapia from TU Delft Civil Engineering. First, it ensures that interviewees are knowledgeable about the topic because they are involved in the LEAD project. Second, the personal reference and contact increases the probability that they want to participate. Third, it is easier and faster to reach the required person within a large, multi-dimensional organisation such as a municipality.

Finally, it was decided to transcribe the interviews because it is the best way to represent them in a thesis report. Moreover, the simple data processing method is selected because the number of interviews is low. Also, as it is semi-structured, it is difficult to literally compare answers to questions because they differ. Therefore, the summary with the predetermined topics aims to cover all relevant information in a structured but flexible manner.

2.6.4. Advantages and disadvantages
Semi-structured interviews have various advantages and disadvantages. First, regarding the advantages, according to Myers and Newman (2007), semi-structured interviews sensitise the researcher to the complexity of the interview process, and show the need for interviewers to be flexible and to improvise. (Longhurst, 2003, pp. 143 – 153) adds to this by stating that this form of interviewing has some degree of predetermined order but still ensures flexibility in the way issues are addressed by the informant.

Then, regarding the disadvantages, Fox (2009) states that the quality of the data collected in an interview will depend on both the interview design and on the skill of the interviewer. Questions may not be understood by the interviewee or be influenced by the responses of the interviewer (Fox, 2009). Myers and Newman (2007) describes this as "Hawthorne effects", where the interviewer is not an invisible, neutral entry, but rather is part of the interactions and might thus influence the interviewee's behaviour. Additionally, there is time pressure in which the interviewee has to answer (Myers & Newman, 2007). Finally, semi-structured interviews are more time-consuming to process than structured interviews because of the open-ended questions (Fox, 2009), leading to lower uniformity across respondents (Myers & Newman, 2007). But, Myers and Newman (2007) also state that this is not a problem because usually, a lower number of stakeholders is involved who differ greatly from each other.

Moreover, there are advantages and disadvantages to the selected setting. An online meeting is neutral, informal, quiet, easily accessible (Myers & Newman, 2007), and using a recording allows to

fully focus on and listen to the conversation, instead of feeling the urge to write things down (Longhurst, 2003, pp. 143 – 153). However, it might be more difficult to read body language (Fox, 2009).

Finally, the advantages of recruiting interviewees through Rodrigo Tapia from TU Delft Civil Engineering are that the interviewees are knowledgeable about the topic, the probability that they want to participate is higher, and it is easier and faster to reach the desired person. However, the disadvantage is that this might constrain creativity.

2.6.5. Influence on results

From the discussion of advantages and disadvantages, it can be concluded that preparation is key. Thus, the interviewer should aim to be unbiased, systematic, thorough, well-prepared, non-judgemental, familiar with the topic, and a good listener. Furthermore, Myers and Newman (2007) point out that "everyone is an interpreter", so if something is unclear, clarifications need to be asked. If this is not correctly done, the results might be inaccurate. The same happens if the interviewee does not feel comfortable sharing their thoughts. All in all, the interview traits described above are critical in obtaining the desired results.

Finally, from the first and third interviews, it was concluded that there is a lack of knowledgeable stakeholders in the Netherlands. Crowdshipping is only a small part of the LEAD project. From the second interview, it was concluded that Nimber has found a successful business model. Many lessons can be learned from this. However, the scope of Nimber and this thesis differ greatly. For instance, Nimber has a commercial point of view. Anyone who wants to deliver something for someone else, can do this. Whether the trip is already being made is irrelevant. This thesis, focuses on both value-driven and profit-driven crowdshipping due to the expected societal impacts. Additionally, Nimber is mostly based on Norway. The country is characterised by high willingness-to-pay and large distances. The Netherlands, on the other hand, is a small, densely-populated country. The prices for traditional LSP deliveries are relatively low, which causes a low willingness-to-pay for crowdshipping. For all these reasons, after these three interviews, it was decided that a sufficient degree of information saturation has been reached.

2.7. SFF framework

This section describes the methodology of constructing the framework by describing the goals, approach, rationale, advantages and disadvantages, and its influence on the results.

First, it is necessary to define SFFs. Feitelson and Salomon (2004, p. 12) describe success and failure factors as "factors that affect adopting of innovations at societal level". The Cambridge Dictionary describes factors as "a fact or situation that influences the result of something". Success factors were first described by Daniel (1961, p. 111). He describes success factors as "key areas that must be exceptionally well-done for an organisation to be successful". The definition that will be used in this thesis lies in between simply "affect" and "must be exceptionally well-done". It will also include the dictionary definition of factor. Namely, this thesis defines an SFF as "*a fact or situation that must be of a satisfactory level for the innovation to become a success*". If an SFF has met the satisfactory level, it is considered a success factor. Otherwise, it is considered a failure factor.

2.7.1. Goals

The goal of this Chapter is to show the success and failure factors of crowdshipping in a framework. The research question linked to the framework was as follows: *How can the success and failure factors be captured in a framework?* It clarifies these factors and how they interact based on literature and stakeholder interviews. Additionally, it shows how the success of crowdshipping can develop over time.

2.7.2. Approach

The approach to create this framework is as follows.

1. Conduct literature study to identify relevant case-specific factors

2. Conduct semi-structured interviews to identify factors considered relevant by the stakeholders

3. Conduct literature study to identify relevant frameworks

The literature study in step 1 was conducted according to Section 2.2, and the interviews in step 2 was according to Section 2.6. For step 3, the frameworks by Feitelson and Salomon (2004) and Geels (2002) were used as a basis. They are shown in Figures B.3 and B.4, respectively. Additionally, the articles by Hekkert et al. (2007) and Wieczorek and Hekkert (2012) were used for forward and backward snowballing.

Then, after the information has been gathered, the framework was constructed in draw.io, a software for making diagrams and charts. Special attention was paid to creating links between and integrating factors from the base framework, literature, or stakeholders. Additionally, it was made clear which factors were taken from which source or how they were adapted to fit crowdshipping. After construction of the framework, it was applied to crowdshipping, specifically pointing out the relevant findings in literature. The theoretical implications for Feitelson and Salomon (2004) were described based on the factors from literature and stakeholders.

2.7.3. Rationale
Literature study is an excellent method to identify relevant case-specific factors, because it allows to search in-depth in the niche of crowdshipping literature. Then, including semi-structured interviews to find SFFs suits the goal of using multiple sources to complement the factors found in literature, as there might be a gap between the theoretical and practical perspectives. Finally, regarding literature search on frameworks, it must be noted that there is a myriad of frameworks available in literature which are all applied to a specific case or technology. Therefore, Feitelson and Salomon (2004) and Geels (2002) were taken as a basis because they have been proven very useful and applicable.

2.7.4. Advantages and disadvantages
The literature search and stakeholder interviews have the same advantages and disadvantages as described in Sections 2.2 and 2.6, respectively. Taking Feitelson and Salomon (2004) and Geels (2002) as starting points has the advantage that they are useful and applicable frameworks. Additionally, it is accurate because the author is already familiar with the frameworks. This combination allows for a more in-depth combination of frameworks, and fitting them well to the case. However, the disadvantage is that newer frameworks may be excluded.

Finally, the advantages of draw.io include that the software is free, easily accessible, and user-friendly. Furthermore, the author is already familiar with the software and its functionalities. No major disadvantages are identified.

2.7.5. Influence on results
Based on the rationale, advantages and disadvantages, it can be concluded that the approach will lead to accurate results in answering SQ2. When conducting the literature search and interviews, special attention must be paid to the links between the factors, how they influence each other, and whether they are crucial for the success or failure of crowdshipping.

3

Literature review into last-mile delivery methods

The goal of this Chapter is to address the academic knowledge gap and define the main research question by conducting a literature review into last-mile delivery methods. First, the theoretical background is provided. Then, knowledge gaps are identified based on a literature review. This literature overview into last mile delivery is the first step in identifying the knowledge gap and research question. Based on this identification, Chapter 4 will provide another literature review, which will be more closely zoomed into the topic of the research question. Both Chapters follow the methodology described in Chapter 2.

3.1. Brief state-of-the-art and historical backdrop
The state-of-the-art and historical backdrop are as follows. Lu et al. (2019) state that the consumption of fossil fuel in freight transportation is a main source of environmental pollution. By 2050, the transport-related carbon emissions are predicted to account for 60% of the world's carbon emissions (McKinnon, 2010). Especially home-delivery services and the inherent large parcel flows, contribute highly to problems in urban areas (Morganti et al., 2014). Last mile is the biggest contributor to these problems, as it is the most expensive and most complicated part of the supply chain, causing negative impacts such as pollution and congestion in cities (Cardenas et al., 2017). Although the research interest in the area of last mile logistics is increasing, the applied research perspectives have not conduced considerable efforts into sustainable last mile delivery methods (Mucowska, 2021).

3.2. Identification of knowledge gap based on a literature review
A literature review was conducted to identify the knowledge gap. The literature review had a wide scope of various last mile delivery methods, and aimed to identify one promising delivery method to continue with as a thesis project. Additionally, the aim was to identify which criteria to evaluate the delivery method were commonly considered by articles. The considered articles are shown in Table A.1 in the Appendix.

The considered articles show great differences in research goal and methodology. However, the similarity between all articles is that all emphasise that the last mile is very important and that this causes large costs. To identify the knowledge gap, all articles were assessed based on the delivery methods they considered, and the criteria on which they evaluated these delivery methods. This is shown in Table 3.1. Then, one delivery method was identified as most promising, which will be continued with in the Master Thesis Project. These and other results of the literature review will be explained below.

Firstly, Table 3.1 shows large differences in delivery methods considered by the articles. Commonly mentioned delivery methods include electric vehicles (e.g. He and Haasis (2019); Mucowska (2021)), cargo bikes (e.g. Melo and Baptista (2017)) or current delivery methods (e.g. Evangelista et al. (2018); Gevaers et al. (2014); Lagorio et al. (2016)). Interestingly, there are variations in specifications of delivery methods: He and Haasis (2019) speak of electric, robotic and modular (e-)vehicles, and Chen and Silva (2021) mention low-emission vehicles. From Table 3.1, it can be concluded that many delivery methods are discussed in literature. One of these methods, crowdshipping, is very promising but has not been implemented on larger scale. According to Mucowska (2021, p. 17), this delivery method,

where goods are delivered with use of the crowd for appropriate compensation, "is significant enough to become a separate trend in future research in developing green last mile e-commerce deliveries". She recommends to further investigate the practical aspects of crowdshipping and its conditions of becoming a viable alternative for last mile e-commerce deliveries. This is endorsed by Karakikes et al. (2018), who state that these cooperative-oriented solutions are certainly favourable topics for logistics studies.

Thus, the main research gap relates to the promising potential of crowdshipping as a last mile delivery method in urban areas. The delivery method is promising, but more research needs to be done regarding the success and failure factors to what extent the barriers resulting from the SFFs could to be overcome.

Secondly, insight was gained into the criteria to evaluate the delivery method by grouping them into four categories: costs, sustainability, societal impacts, and other. This can be seen in Table 3.1. The reason for this, is that these evaluation criteria could lead to SFFs of the delivery methods mentioned in literature. Most articles mainly focused on the cost aspect, by optimising current processes or analysing cases. For instance, Gevaers et al. (2014) develop a model to simulate the B2C last mile costs per unit delivered. Additionally, Cardenas et al. (2017) examine the criteria that influence the cost structure of the parcel delivery market. Besides cost criteria, sustainability criteria were considered. Although the number of published articles has increased in the past years (Evangelista et al., 2018), the focus on sustainability is still lacking, as pointed out by Browne et al. (2012); Evangelista et al. (2018); Mucowska (2021); and Zhang et al. (2020). As can be seen in Table 3.1, the only papers that assess the sustainability aspect are literature reviews. For instance, Browne et al. (2012) conclude on which levels green initiatives are taking place, and He (2020) created a framework of sustainable and flexible future urban freight planning based on trends of city development.

This relates to the knowledge gap as follows. Literature shows that besides costs criteria, the sustainability criteria of crowdshipping should be considered. The identified evaluation criteria could be indicators success and failure factors of crowdshipping.

Finally, besides costs and sustainability criteria, societal impacts are mentioned in literature. Most often, this entailed traffic congestion or noise pollution (e.g. He and Haasis (2019)). Interestingly, these were the same articles that considered sustainability aspects. Other societal impacts mentioned were habitat loss (Mucowska, 2021), infrastructure requirements (He & Haasis, 2019) or geographical area (Gevaers et al., 2009; Gevaers et al., 2014). Additionally, governmental aspects were mentioned by Evangelista et al. (2018) and Zhang et al. (2020). Additionally, other criteria commonly mentioned entailed the market (Evangelista et al., 2018; Gevaers et al., 2009; Zhang et al., 2020).

3.3. Interpretation of results

From this literature review, it can be seen that there are many problems in last-mile delivery. The biggest problems regard environmental aspects. Literature discusses many different methods, of which one is remarkable: crowdshipping. Potentially, crowdshipping might provide a solution to last-mile delivery problems in urban areas. It is a promising delivery method into which little research has been done. Especially the SFFs for implementation are hardly researched. This thesis aims to fill that knowledge gap.

Moreover, this literature review considered the aspects upon which delivery methods can be evaluated. These aspects will form the basis for the societal impacts diagram in Chapter 5 and SFF framework construction in Chapter 8.

Author(s)	Year	Delivery methods considered	Evaluation criteria considered					
			Costs	Sustainability	Societal impacts			Other
					Traffic congestion	Noise pollution	Other	
Browne, M., Allen, J., Nemoto, T., Patier, D., Visser, J.	2012	• Urban freight transport in general		✓ Air pollution, greenhouse gas emission	✓		Accident-related fatalities and injuries	
Cardenas, I.D., Dewulf, W., Vanelslander, T., Smet, C., Beckers, J.	2017	• Pick-up points • Home deliveries	✓				✓ Negative externalities (not specified)	Efficiency
Chen, Y., Silva, E.A.	2021	• Low-emission vehicles • Bike-sharing • Park and ride' • Crowdshipping	✓ Energy consumption				✓ Air quality	Innovation indices, composite index
Evangelista, P., Santoro, L., Thomas, A.	2018	• Current third-party logistics modes	✓				✓ Governmental aspects	Organisational, market-related, technical
Gevaers, R., Van de Voorde, E., Vanelslander, T.	2009	• Current technologies, e.g. vans	✓ Fleet and technology	✓ Environment			✓ Service levels, security, geographical area	Market penetration
Gevaers, R., Van de Voorde, E., Vanelslander, T.	2014	• Current technologies, e.g. vans	✓	✓ Environmental impact			✓ Security, geographical area	Level of consumer service, security and delivery type; the degree of market penetration and density; the vehicle fleet and technology employed
He, Z.	2019	• Electric vehicles • Crowdshipping • Cargo bikes • Autonomous vehicle • Mobile depots	✓ Efficiency	✓ Emissions	✓	✓	✓ Land-use conflict, security	Flexibility, delivery range
He, Z., Haasis, H.D.	2019	• Electric vehicles • Modular e-vehicles • Public transit system • Urban waterway logistics • Taxi logistics • Cargo bikes • Robotic vehicles • Delivery drones • Parcel lockers • Mobile depots	✓ Travel range, load capacity				✓ Infrastructure requirements	Status on GE-matrix, process of application, external elements, suitable industry
Karakikes, I., Nathanail, Ef., Savrasovs, M.	2018	• Urban consolidation centres • Home deliveries system • Cargo bikes • City lockers • Crowdshipping					✓ Spatial restrictions	✓ Preferences of city logistics studies through modelling

Lagorio, A., Pinto, R., Golini, R.	2016	• Urban logistics in general	✓					Logistics and operational perspective
Melo, S., Baptista, P.	2017	• Cargo bikes	✓ Cost levels and efficiency	✓			✓ Mobility, the quality of life	
Morganti, E., Seidel, S., Blanquart, C., Dablanc, L., Lenz, B.	2014	• Automated parcel stations equipped with lockers and pick-up points	✓ Number of successful first-time deliveries, number of delivery rounds, operational costs					
Mucowska, M.	2021	• Electric vehicles and bikes • Parcel lockers • Crowdshipping		✓ Reduction of pollution		✓	✓ Habitat loss	
Zhang, M., Sun, M., Bi, D., Liu, T.	2020	• Green technologies in general		✓ Carbon emissions	✓	✓	✓ Government level: laws and regulations, government policies	Enterprise level (e.g. green logistics facilities, green technology innovations)

Table 3.1. Overview of selected literature regarding delivery methods and evaluation criteria considered

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Analysis: Literature review into crowdshipping

Literature research into last mile delivery methods in Chapter 3 concluded that crowdshipping has promising potential. The goal of the current Chapter is to provide the historical backdrop, state-of-the-art, and societal impacts of crowdshipping. It is organised as follows. First, a brief introduction and historical backdrop are provided. Second, the general concept of crowdshipping is explained. Third, state-of-the-art is provided. The Chapter ends with an interpretation of the results.

4.1. Introduction and historical backdrop

Transport has an essential role in society (Paloheimo et al., 2016). Urbanisation and income growth increased the importance of last mile delivery in urban areas over the past years (Macharis & Kin, 2017). However, delivery services have great societal impacts, e.g. congestion, nuisance, CO_2 emissions, accidents, travel time loss, and decreased safety (Buldeo Rai et al., 2017; Mucowska, 2021; Van Wee et al., 2004). To counteract this, cities have implemented restrictive measures to decrease CO_2 emissions in cities (European Commission, 2021; Macharis & Kin, 2017; Melo & Baptista, 2017). Crowdshipping has been identified as a promising delivery method that is able to solve many of these problems (Buldeo Rai et al., 2017; Le et al., 2019; Mucowska, 2021; Rougès & Montreuil, 2014).

The crowdshipping industry arose around 2012, with a limited number of companies (KPMG, 2014). In the more recent years, it has become a developing and growing market (Buldeo Rai et al., 2017). Crowdshipping has attracted the interest of large companies such as Amazon, Google, DHL, Walmart, and eBay (Buldeo Rai et al., 2017; Punel et al., 2018; Rougès & Montreuil, 2014). However, many of these large companies have gone out of business due to barriers including attracting critical mass, trust issues (Rougès & Montreuil, 2014), and low involvement rates (Marcucci et al., 2017). Furthermore, several start-ups have emerged in Europe, e.g. Nimber in Norway [1], PiggyBaggy in Finland [2], Bringbee in Switzerland [3], and Koiki in Spain [4] (Buldeo Rai et al., 2017; Rougès & Montreuil, 2014). Some of these were more successful than others, but none of them has grown very big or has made a remarkable impact (Buldeo Rai et al., 2017). Additionally, no such initiative has yet appeared in the Netherlands.

Crowdshipping is part of a larger trend: the sharing economy (Arslan et al., 2019; Rougès & Montreuil, 2014). Frenken et al. (2015) define sharing economy as *"consumers granting each other temporary access to under-utilised physical assets ("idle capacity"), possibly for money"*. The advantages of the sharing economy are that physical assets become services that can be shared, (re)distributed, and (re)used in a cheap and easy manner (Arslan et al., 2019). Similarities with the definition of crowdshipping by Buldeo Rai et al. (2017) are as follows. "Under-utilised physical assets (idle capacity)" regards "the crowd's free capacity for time or space on their trip", "possibly for money" refers to "compensated accordingly", and "temporary access" refers to "logistics services" in combination with "participates on

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[1] www.nimber.com
[2] www.piggybaggy.com
[3] www.bringbee.ch
[4] www.koiki.es

a voluntary basis".

Existing research into crowdshipping has mainly focused on routing-and-matching optimisation (e.g. Cheng et al. (2022) and Triki (2021)); organisational aspects of integrating crowdshipping into existing logistics processes (e.g. Lin et al. (2020)); sustainability issues (e.g. Buldeo Rai et al. (2017) and Macharis and Kin (2017)); business models (e.g. McKinnon (2010) and Rougès and Montreuil (2014)); or behavioural aspects through preference surveys or choice models (e.g. Cebeci (2021), Kourounioti et al. (2021), Punel et al. (2018), and Wicaksono et al. (2021)).

4.2. General concept of crowdshipping

The general concept of crowdshipping is roughly the same across the various platforms. First, the customer posts the requested delivery. Second, a task is created on the platform. Third, the customer and courier are matched. Fourth, the price is determined. Fifth, the courier performs the requested delivery. Sixth, the customer and courier may contact each other if needed. Seventh, the customer rates the courier (Rougès & Montreuil, 2014). The interactions between customer, platform, and courier are depicted by Le et al. (2019) as follows.

Figure 4.1: General concept of crowdshipping by Le et al. (2019)

Thus, essential stakeholders in the crowd are the couriers, customers, and platform. In Figure 4.1, they are called supply, demand, and operations & management, respectively.

Buldeo Rai et al. (2017) distinguish seven elements that are crucial to crowdshipping, which are the following: technological infrastructure; free capacity; crowd network; undefined character; external to the company; compensation; voluntary. These elements will now be explained in more detail. First, *technological infrastructure* is the means to coordinate demand and supply. In this thesis, it will simply be called "platform". The company or organisation running the platform will also be referred to as "platform". Second, *free capacity* refers to the idea that deliveries are made using the excess capacity on already existing trips. Free capacity can refer to both volume and time. Third, *crowd network* refers to the network of potential couriers. Fourth, *undefined character of the crowd* refers to their unknown identity and lack of commitment. Fifth, *external to the company* refers to the fact that the crowd does not become an employee. Sixth, *compensation* refers to the payment that the courier receives for their service. Finally, *voluntary* refers to the voluntary engagement of the crowd. They can participate whenever they wish.

4.3. State-of-the-art

In this section, the state-of-the-art will be analysed in more detail by studying the specification of crowdshipping described in literature. To do this, a concept tree was created, stating the forms in which crowdshipping can take place. It was mainly based on the typology of business models in crowdshipping industry by Rougès and Montreuil (2014), the crowd logistics characteristics by Buldeo Rai et al. (2017), and the crowdshipping components defined by Le et al. (2019). Information from other sources supplements this. The constructed concept tree is shown in Figure 4.2.

Now, the manner in which Figure 4.2 should be read will described. Starting from the top of the tree, in crowdshipping, a distinction can be made between the users (who form the supply and demand), and the platform & operations side. These users can be divided into customers, who form demand,
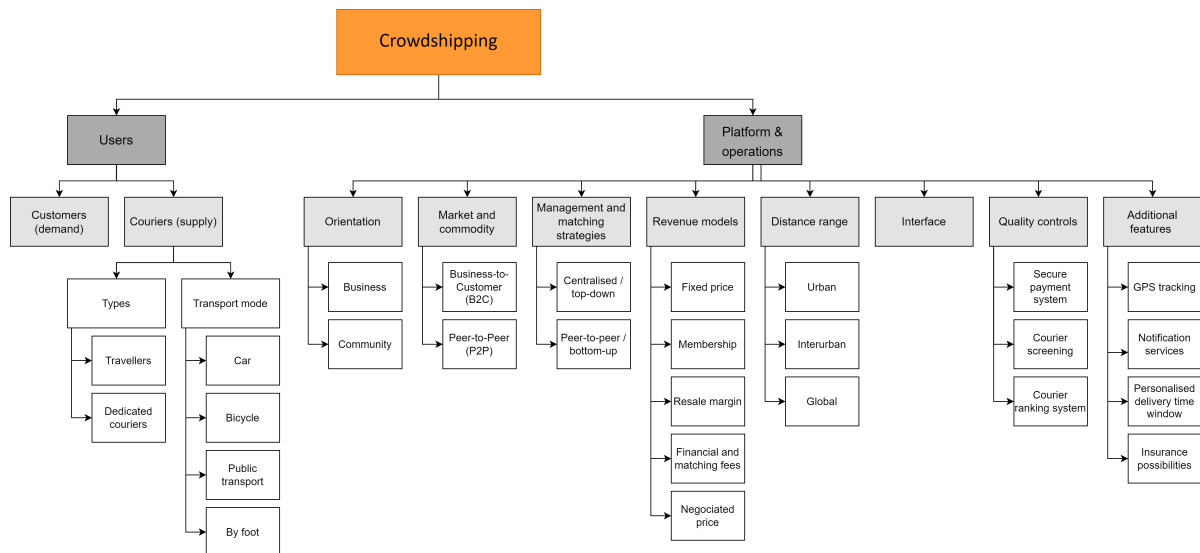
Figure 4.2: Concept tree

and couriers, who form supply. There are two types of couriers: travellers, and dedicated couriers. Each courier can choose from various transport modes.

Next, the platform & operations side has eight features. First, the orientation can be either business or community. Second, the market and commodity target can be either business-to-customer or peer-to-peer. Third, the management and matching strategies can be centralised or peer-to-peer. Fourth, there are five types of revenue models. Fifth, the distance range can be urban, interurban, or global. Sixth, platforms may have a wide variety of interface options. Seventh, the platform may implement various quality control options. Eighth, the platform & operations may implement additional features, including GPS tracking and insurance possibilities. The following Subsections separately describe each of the branches.

4.3.1. Users
The users are people who participate of the crowdshipping service, either as a customer, as a courier, or both. Often, literature does not distinguish whether the user is active on the customer or courier side. For instance, Punel et al. (2018) develop a binary logit model to quantify to what extent the attitudes and preferences of crowdshipping users differ from non-users. Moreover, Cheng et al. (2022) focus on the optimisation of delivery-route planning. However, as this thesis focuses on thoroughly analysing how crowdshipping could be implemented, it is necessary to separately delineate these groups. More detailed information about the customers and couriers can be found in Chapter 6.

4.3.2. Customers (demand)
The supply is formed by couriers. Literature refers to them as couriers, drivers, driver-partners, or shippers. In this thesis, they will be called couriers. These couriers are defined by Triki (2021, p. 1) as *"anyone willing to use his vehicle to deliver customers' orders - on his way to his prescheduled destination - and is willing to perform one or more deliveries to achieve a small business opportunity"*.

4.3.3. Couriers (supply)
The demand is formed by customers. Literature refers to them as customers or senders. These couriers are defined by Le et al. (2019, p. 1) as *"actors who request to send the shipment via crowdshipping"*.

In general, two types of couriers can be distinguished: travellers and dedicated couriers. Travellers are opportunist couriers who travel anyway (Le et al., 2019; Rougès & Montreuil, 2014). For instance, to their work or family. Dedicated couriers, on the other hand, are individuals who choose to accept some extra tasks. The reasons to do this are either to create a flexible job, or commit to delivery services (Rougès & Montreuil, 2014). The crowdshipping principle is based on the exploitation of trips

that would already be made by travellers. However, Rougès and Montreuil (2014) find that the most promising start-ups depend on dedicated couriers, and not on travellers. For instance, the courier base of Zipments, a crowdshipping delivery service in the US, is composed of 95% dedicated couriers.

Couriers have various options for transport modes, such as car, bicycle, public transport, or by foot. Although this modal choice highly affects sustainability impacts, Buldeo Rai et al. (2017) find that users and the platform do not pay much attention to this. Next, they argue that the modal choice impacts the health benefits resulting from crowdshipping. For instance, in the pilot described by Paloheimo et al. (2016), various couriers stated that exercise was a reason for them to participate.

4.3.4. Operations & management

The operations and management side is done by the platform, as it is able to match the couriers and the customers. Platforms can have many features, which will be shown in Chapter 4. Le et al. (2019) defines it as *a common platform where senders can announce their need for shipping freight and receive offers from system couriers*.

4.3.5. Orientation

Rougès and Montreuil (2014) distinguish that companies can either be business or community oriented. In the business orientation, relevant aspects include market share, profitability, and return on investment. In the community orientation, relevant aspects include being useful to the community, human touch, and trust.

4.3.6. Market and commodity

Depending on the business or community orientation, platforms may address either business-to-customer (B2C) or peer-to-peer (P2P) markets. B2C is where the customer places an order with a retailer, who outsources delivery to the crowdshipping platform. P2C platforms focus on matching customers and couriers (Rougès & Montreuil, 2014).

Depending on the market, platforms typically allow for a wide variety of products, including laundry, prepared meals, groceries, flowers, plants, and retailing goods (Buldeo Rai et al., 2018; Dablanc et al., 2017).

4.3.7. Management and matching strategies

Le et al. (2019) identify two main management and matching strategies: centralised or top-down, and peer-to-peer or bottom-up. In centralised management, the platform determines the price for a delivery. It selects candidates and offers the optimum route. This requires more complex algorithms and computational efforts. In peer-to-peer management, on the other hand, users negotiate about the price and when they want to deliver. This yields sub optimum performance of the platform due to inefficient negotiations, routing and delivery processes.

4.3.8. Revenue models

Five revenue models can be considered: fixed price; membership; resale margin; financial and matching fees; and negotiated price (Rougès & Montreuil, 2014). First, fixed price means standardisation of delivery requests, with possible incremental charges for special wishes (e.g. evening delivery). Second, membership means a fee, with which a number of deliveries can be sent within a certain amount of time. Third, resale margin is applicable when the platform adds a mark-up to the retailer prices. Fourth, financial and matching fees means means that the platform functions as escrow to guarantee safety. The platform receives a commission or matching fee. Fifth, negotiated prices means that the sender sets a target price, couriers bid, and they negotiate about the final price.

Le et al. (2019) argue that fixed prices and resale margin work for urban deliveries. Negotiated prices work for interurban deliveries. Membership works for both urban and interurban. Finally, financial and matching fees work for international deliveries.

4.3.9. Distance range

Rougès and Montreuil (2014) distinguish three distance ranges: urban, interurban, and global. The first regards crowdshipping within (big) cities, the second considers deliveries from town to town, and the third considers an even larger scale. Urban services are most frequent (Le et al., 2019; McKinnon, 2016; Rougès & Montreuil, 2014). Li et al. (2014) argue that the performance of crowdshipping improves in urban areas.

4.3.10. Interface

Crowdshipping platforms may have various interfaces. The most common ones are websites or mobile applications, with or without geolocation (McKinnon, 2016; Rougès & Montreuil, 2014; Triki, 2021). However, in the crowdshipping pilot described by Paloheimo et al. (2016), the crowdshipping platform was integrated with the library's online environment to notify people they had crowdshipping possibilities. Additionally, depending on the target group, more old-fashioned manners (e.g. through telephone calls) are possible.

4.3.11. Quality controls

The platform may implement various measures to ensure that the quality is met. For instance, building a secure payment system, screening couriers, or allowing customers to rank their couriers (KPMG, 2014; Le et al., 2019; Rougès & Montreuil, 2014).

4.3.12. Additional features

Finally, additional features include GPS tracking (Mladenow et al., 2016), notification services (Le et al., 2019), the possibility to select a delivery time window (Gatta et al., 2018)), or insurance possibilities (Le et al., 2019).

4.4. Two manners of crowdshipping

From the literature review, it can be concluded that crowdshipping can be implemented in many different ways. The biggest difference regards the selection of couriers. Roughly, there are two manners: value-driven crowdshipping with travellers and profit-driven crowdshipping with dedicated couriers. The next two subsections will explain these manners in more detail.

4.4.1. Value-driven crowdshipping

In value-driven crowdshipping, couriers are travellers. They are already on their way to a prescheduled destination, such as visiting friends or family. Their motivation to participate in crowdshipping regards the environment or community spirit. They use greener transport modes (e.g. biking, or walking), and deliver packages in their neighbourhood. One example can be seen by Paloheimo et al. (2016), in which library books are delivered to less mobile people, often by bicycle. This matches with the community orientation identified by Rougès and Montreuil (2014).

4.4.2. Profit-driven crowdshipping

In profit-driven crowdshipping, couriers are dedicated couriers. The main reason to make the trip is to make money through crowdshipping. There are several successful (e.g. Nimber) and less successful (e.g. DHL, Amazon) companies that have tried crowdshipping from a commercial angle (Rougès & Montreuil, 2014). Rougès and Montreuil (2014) find that most promising start-ups depend on dedicated couriers, and can thus be classified as profit-driven crowdshipping companies. This matches with the business orientation they identified.

It might seem that profit-driven cannot be considered a form of crowdshipping because the couriers make the trip especially for the delivery. However, the *free capacity* from the definition by Buldeo Rai et al. (2017, p. 1) can also be interpreted in terms of time rather than space. The dedicated couriers would otherwise do nothing with their available time, which they are now using more efficiently. Additionally, the definition by Buldeo Rai et al. (2017, p. 1) does not state that the trips should be already made. Finally, profit-driven crowdshipping is different from traditional LSPs because the dedicated drivers are amateurs.

4.5. Interpretation of results

The literature review into crowdshipping showed that urbanisation and income growth increased the importance of last mile delivery over the past years (Macharis & Kin, 2017). Existing research has mainly focused on routing-and-matching optimisation or behavioural aspects through preference surveys or choice models. Besides Lin et al. (2020), who investigated the relations between shipping performance and intrusiveness to daily trips of commuters who voluntarily act as cycle couriers, the scope of urban areas in the Netherlands has not appeared before.

Moreover, the sharing economy is growing and has many advantages (Arslan et al., 2019). Companies participating in crowdshipping have several aspects in common. Namely, they depend on technological infrastructure and use free capacity. The supply is formed by a crowd network with an undefined character, which is external to the company. The crowd receives compensation and participates voluntarily (Buldeo Rai et al., 2017). In general, the crowdshipping process is as follows. A customer posts the requested delivery and creates a task on a platform. Courier and customer are matched and a price is proposed. Courier and customers can communicate about delivery time and location and the customer may rate the courier (Rougès & Montreuil, 2014). However, there are also differences. Namely, companies differ on type of couriers; orientation; market and commodity; management and matching strategies; revenue models; distance range; interface; quality controls; and additional features. Moreover, additional features have been implemented to attract customers and couriers. Examples are GPS tracking (Mladenow et al., 2016) or notification services (Le et al., 2019). These are comparable to features offered by traditional LSPs. However, examples of insurance possibilities (Le et al., 2019) are specific for crowdshipping.

The crowdshipping industry has attracted various companies (Buldeo Rai et al., 2017; KPMG, 2014), all focused on making profit or extending their services. Most businesses have quit due to problems finding sufficient couriers and trust issues (Rougès & Montreuil, 2014).

It is interesting to notice that there are differences between implementation. This suggests that there is not yet one optimum way of crowdshipping or one monopolist. For this reason, customers have more freedom in choosing a company that matches with their demands. However, this also limits scale advantages, which might be necessary for the effectiveness. Additionally, it is interesting to see that many companies have quit. The large drop-out rate and the many differences in implementation underscore that there is no explicit research into the most optimum manner. This thesis can play a role in determining this.

The review of various implementations of crowdshipping shows that the biggest difference regards the type of courier. A distinction can be made between value-driven crowdshipping, where packages are transported by travellers who are driven by environmental concern and community spirit. On the other hand, in profit-driven crowdshipping, packages are transported by dedicated couriers who are driven by monetary benefits. To identify which manner is most promising, the subsequent analysis aims to identify the societal impacts.

Analysis: Societal impacts diagram

This Chapter discusses the societal impacts of crowdshipping, presuming that it was successfully adopted in urban areas in the Netherlands. It was assumed that crowdshipping is a delivery service that customers can choose in addition to already existing services, such as traditional LSPs (e.g. DHL or PostNL). Additionally, it was assumed that there is a sufficient courier and customer base. Two manners of crowdshipping were evaluated, namely value-driven crowdshipping using travellers, and profit-driven crowdshipping using dedicated drivers. No assumptions were made regarding customer target groups; business or community orientation; market or commodity; management and matching strategies; revenue models; platform interface; quality controls; or additional features. The scenario it is compared to is the current situation, where most goods are transported by traditional LSPs, or friends or family. The diagram in Figure 5.1 shows the impacts for both manners (value-driven or profit-driven) together. The points on which they differ significantly are shown in Figures 5.2 for value-driven crowdshipping and Figure 5.3 for profit-driven crowdshipping.

The societal impacts diagram is shown in Figure 5.1. This shows the structure of impacts and links. Then, subheadings were added to describe the details of the impacts in Figure 5.2 for value-driven crowdshipping and in Figure 5.3 for profit-driven crowdshipping. The next section describes the way in which the societal impacts diagrams should be read. Then, the details of the direct and indirect details are explained separately. Here, the differences between value-driven and profit-driven crowdshipping are pointed out. Then, the societal impacts over time are discussed.

5.1. Societal impacts diagram presentation
The diagram presented below has been constructed based on literature and the diagram from Van Wee et al. (2013). In Figure 5.1, the constructed diagram is presented.

The diagram should be read as follows. First, the innovation is shown in green. This innovation points at factors that are impacted when crowdshipping is successfully implemented. The white factors are determinants for transport and traffic volume and effects from Van Wee et al. (2013). The blue factors or factors surrounded by a blue box are transport and traffic effects from Van Wee et al. (2013). The rectangle represents transport and traffic volume and composition divided over time and space from Van Wee et al. (2013). The factors in boxes with rounded edges (e.g. industry) are umbrella terms and can be divided into subfactors (e.g. competitiveness). Finally, the yellow factors were taken from literature. The grey box shows the legend.

The diagram starts at the source, namely the innovation (in green). Successful implementation of crowdshipping impacts accessibility; safety, risk, and privacy; and way of using vehicles. These are three direct impacts. In turn, they impact other factors, such as transport resistance or resources.

5.2. Explanation of impacts and links
The *conceptual framework for factors having an impact on transport volumes and the impact of the transport system on accessibility, the environment and safety* by Van Wee et al. (2013) was taken as a basis to construct the societal impacts diagram for crowdshipping. The framework by Van Wee et al. (2013) is shown in Figure B.1. Now, it will be explained what factors were kept and changed, discarded
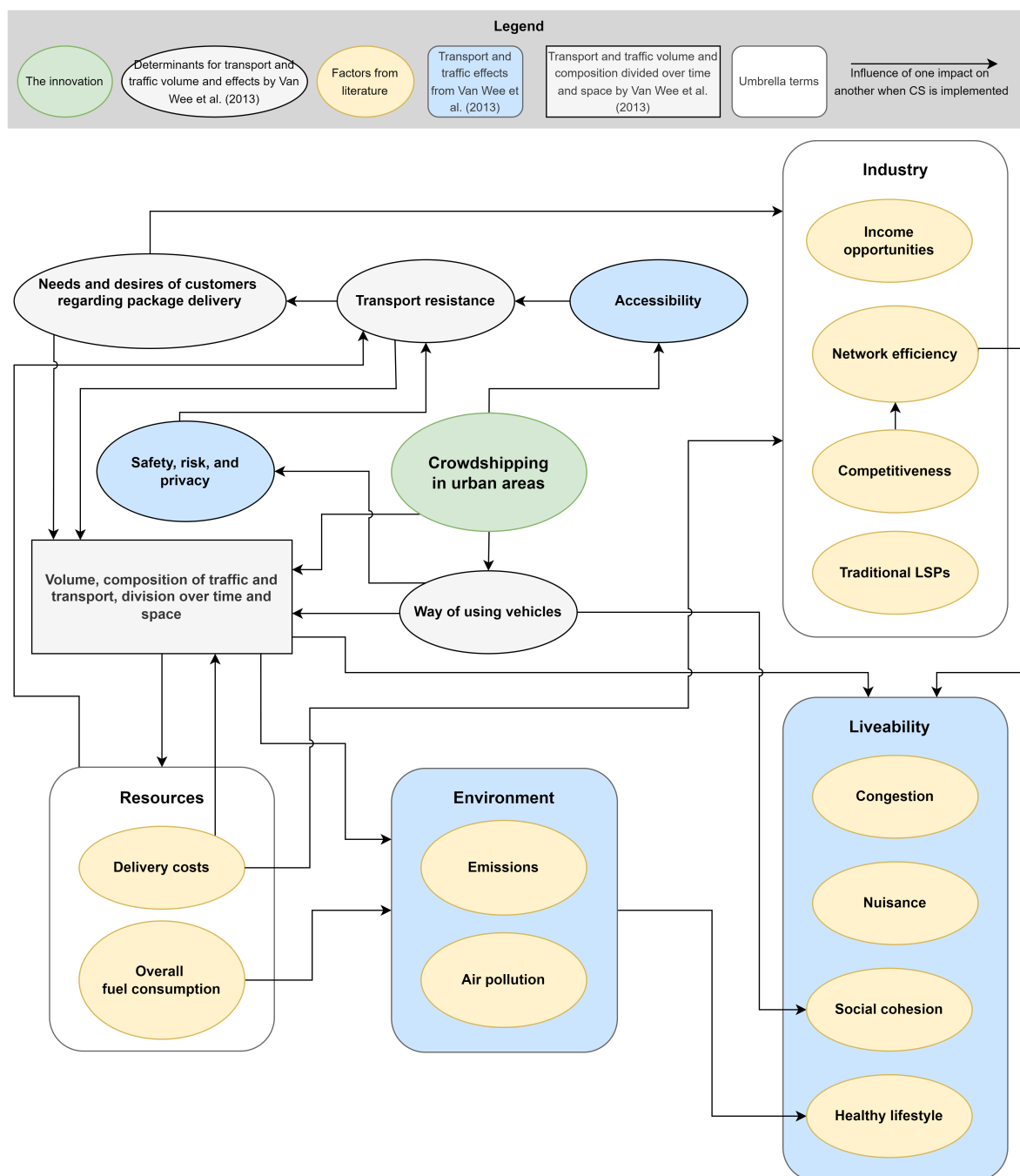
Figure 5.1: Societal impacts diagram

from, or added to the framework. The definitions and brief application of the factors will be provided.

First, the direct impacts. *Way of using vehicles* is the key impact of crowdshipping. Namely, by definition, crowdshipping uses the free capacity with regards to time and/or space on already existing trips. Also, it applies to possibility for the courier to unknowingly transport hazardous goods. The impact *privacy* was added based on literature. Finally, crowdshipping directly influences *accessibility* because crowdshipping provides another possible delivery service and goods become more accessible.

Second, the indirect impacts. This free capacity influences the *volume, composition of traffic and transport, division over time and space* because crowdshipping could impact the package's modal

choice, consolidation of packages, and courier driving decisions. Next, *free capacity* influences *liveability*. Free capacity is used more efficiently, which positively impacts liveability factors. Additionally, *volume, composition of traffic and transport, division over time and space* directly impacts *safety, risk and privacy* because use is made of occasional couriers instead of drivers employed through traditional LSPs. Compared to the original framework by Van Wee et al. (2013), *safety* and *risk* were combined because it applies to the possibility of the package being damaged or lost. Then, the positive impact on *accessibility* impacts the *transport resistance*. This is the resistance needed to travel between locations, including travel time, monetary costs and other aspects such as comfort and safety. Customers are able to choose from more delivery methods and a wider offer of products, which positively impacts *transport resistance*. Moreover, *way of using vehicles* impact *safety, risk, and privacy* because use is made of amateur couriers rather than professionals.

Third, the indirect impacts also indirectly impact other factors. The diagram shows 15 arrows. First, *transport resistance* impacts the *needs and desires of customers regarding package delivery* because lower transport resistance fulfils customer's needs and desires of fast, flexible, and cheap delivery. Compared to the original framework by Van Wee et al. (2013), the words *goods transport* were replaced by *package delivery* to better fit crowdshipping. Second, *resources* needed to transport the package are underlying the *transport resistance*. Third, the *transport resistance* impacts *volume, composition of transport, division over time and space* because the lower the resistance factors, the higher the amount of transport. Fourth, the *volume, composition of traffic and transport, division over time and space* impact the resources due to modal choice, fuel choice, driving during peak hours, etc. Fifth, *volume, composition of traffic and transport, division over time and space* have a direct impact on *environment* because the modality affects emissions, and the division over time and space affects air pollution. Sixth, as crowdshipping is perceived to be less safe than traditional LSPs, *safety, risk, and privacy* are expected to increase the resistance. Seventh, lower *delivery costs* and thus price may increase the volume demanded by customers. Eighth, the *delivery costs* create an incentive for the crowdshipping industry to emerge and develop. Ninth, the *overall fuel consumption* impact the *environment* because of emissions and air pollution. In turn, the impacts on the *environment* impact the *environmental spirit* that is important to society. In the original diagram by Van Wee et al. (2013), *environment* and *liveability* were together. However, to be able to include *well-being* aspects as well, they were separated. Tenth, *liveability* is impacted by *volume, composition of traffic and transport, division over time and space* because the volume and *division over time and space* impact *congestion* and *nuisance*, modal choice impacts *nuisance* and *healthy lifestyle*. Eleventh, *social cohesion* is impacted by *way of using vehicles*. Twelfth, the *needs and desires of customers regarding package delivery* impact the industry because the customer creates the demand that industry reacts to with supply. Thirteenth, the *needs and desires of customers regarding package delivery* affect the *volume, composition of transport, division over time and space* because the needs impact the volume. Fourteenth, the *network efficiency* impacts the *liveability* because a well-performing platform positively reduces *congestion* and *nuisance*, improves *social cohesion*, and promotes a *healthy lifestyle*. Fifteenth, *competitiveness* between platform providers encourages improvement of the *network efficiency* because this is a competitive advantage.

Finally, compared to the original framework by Van Wee et al. (2013), *locations* was discarded. This was because it was assumed that crowdshipping does not impact origin and destination of packages compared to the current situation. Additionally, land use and infrastructure do not change.

5.3. Details of the direct societal impacts according to literature

In Section 5.2, the focus was on the links between impacts. Now, these impacts will be described in more detail based on the differences between value-driven crowdshipping in Figure 5.2 and profit-driven crowdshipping in Figure 5.3. Again, it is divided into direct and indirect impacts. This section focuses on the *direct* impacts.

Way of using vehicles. Crowdshipping allows to use the free capacity with regards to time and/or space on already existing trips (Buldeo Rai et al., 2017). This thus broadens the way of using vehicles. In value-driven crowdshipping, this regards free capacity in terms of space, whereas in profit-driven, this regards free capacity in terms of time.
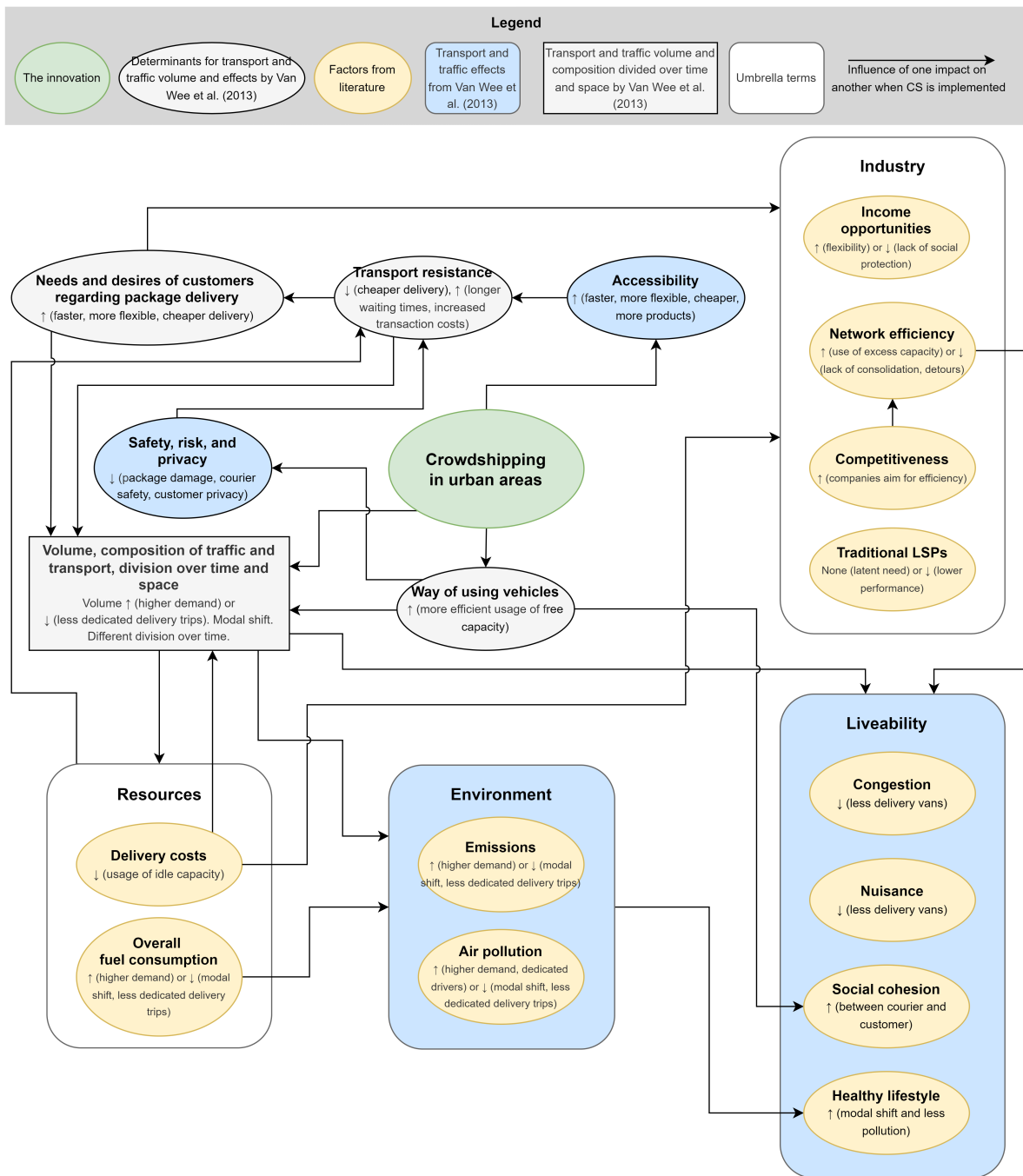
Figure 5.2: Societal impacts diagram for value-driven crowdshipping

Safety, risk and privacy. The usage of occasional amateur drivers rather than professionals poses safety, risk, and privacy issues. The safety issues relate to losses and breakages of packages (Cheng et al., 2022). Also, couriers can be unknowingly exposed to hazardous or illegal substances or products (Rougès & Montreuil, 2014). Additionally, senders will have to share their personal information, including home address, and purchasing habits (Fatnassi et al., 2015). This poses negative effects on privacy.

Accessibility. Crowdshipping creates more possibilities for a package to be transported between locations. This includes faster, more flexible, or more affordable deliveries (Carbone et al., 2017; Rougès
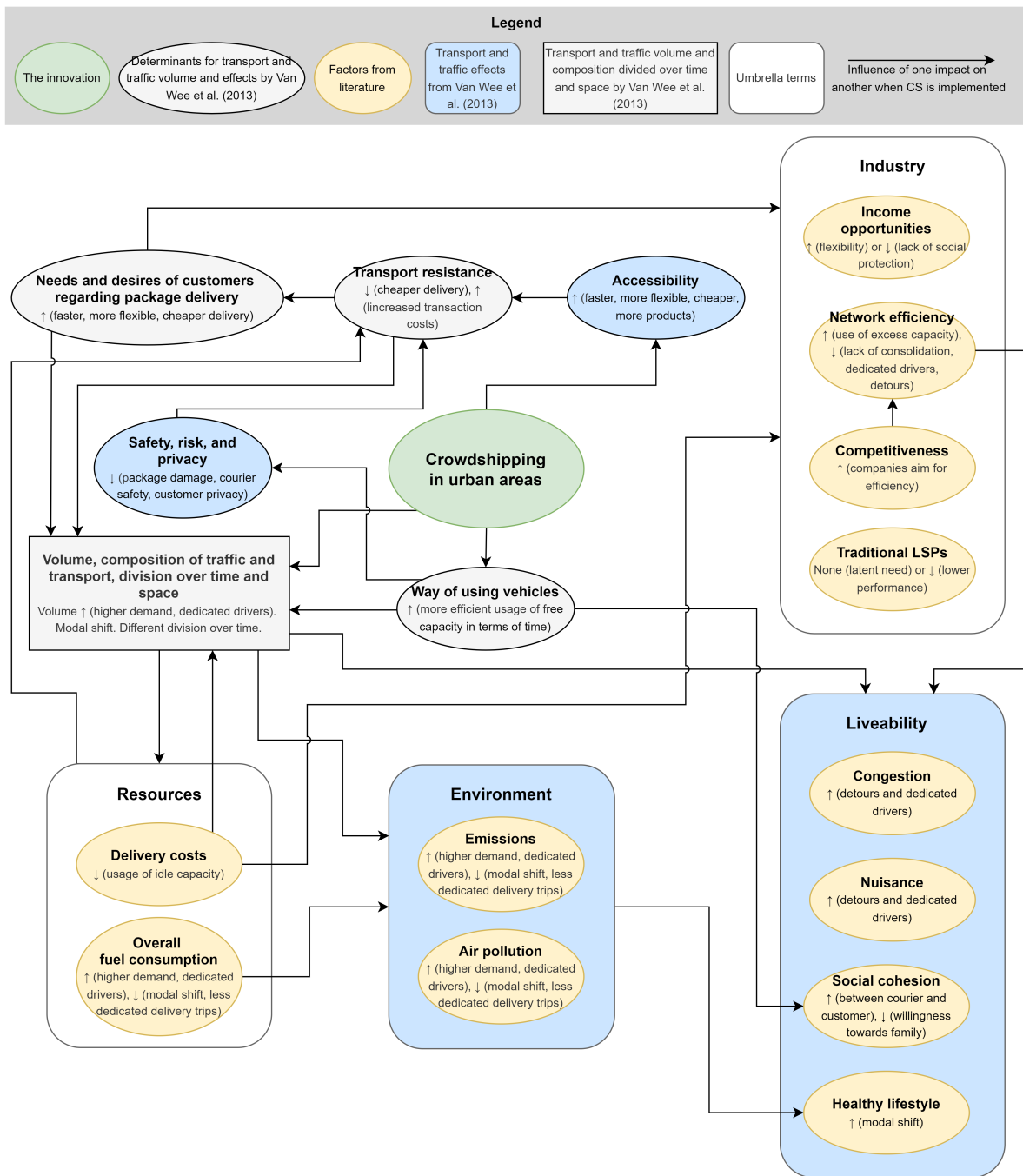
Figure 5.3: Societal impacts diagram for profit-driven crowdshipping

& Montreuil, 2014). Additionally, a wider variety of products may be accessible with crowdshipping (Botsman, 2014). This includes products that did not allow shipping due to geographic restrictions, odd sizes, fragile items, or heavy weights (Buldeo Rai et al., 2018; Rougès & Montreuil, 2014). Also, crowdshipping could enhance possibilities to transport e.g. animals (Rougès & Montreuil, 2014). However, accessibility could also decrease in value-driven crowdshipping because it might take longer before a match with a courier is found (Buldeo Rai et al., 2018). Also, it might take a while before this trip actually takes place. Finally, accessibility in urban areas is already high. Therefore, it can be argued that there is not much room for improvement.

5.4. Details of the indirect impacts according to literature

In Section 5.2, the focus was on the links between impacts. Now, these impacts will be described in more detail. Again, it is divided into direct and indirect impacts. This section focuses on the *indirect* impacts.

Transport resistance. The positive impact on accessibility shows that products can be delivered cheaper. This positively impacts the transport resistance. Additionally, no additional infrastructure (e.g. warehouses, vehicles, R&D) are required. The platform technology form the largest costs (Buldeo Rai et al., 2018). This platform aims to lower transaction costs (Williamson, 2000), thereby lowering transport resistance. However, the transport resistance might also increase due to longer times and increased transaction costs, such as courier and customer communication and consulting the platform.

Volume, composition of traffic and transport, division over time and space. This impact contains three aspects. First, for value-driven crowdshipping, the volume could be expected to *decrease* because packages are transported on already existing trips. This thus eliminates dedicated delivery trips. However, for profit-driven crowdshipping, the volume could be expected to *increase* due to detours or dedicated crowdshipping trips (Buldeo Rai et al., 2018; Ghaderi et al., 2022). Many promising start-ups rely on professional couriers (Rougès & Montreuil, 2014). Additionally, detours could be caused by inefficient matching algorithms or bidding, which platforms are aiming to optimise (Marcucci et al., 2017). Moreover, the volume could be expected to increase due to the lack of consolidation (Kafle et al., 2017). Additionally, Frenken and Schor (2019) argues that in the global North, new activities will allegedly increase demand, rather than substitute other demand. Second, the main advantages of crowdshipping can be found in a different composition of traffic and transport and modality. In general, a shift from vans to passenger cars can be seen (Buldeo Rai et al., 2018). Additionally, crowdshipping allows couriers to transport packages using public transport, biking, or walking (Paloheimo et al., 2016). Third, the division over time and space could shift to peak hours (Le et al., 2019). Couriers who need to make a detour from their way to work or home after work, might do this during peak hours. Drivers from LSPs, on the other hand, deliver packages all day.

Liveability. Liveability is composed of four factors, namely *congestion, nuisance, social cohesion,* and *healthy lifestyle*. First, in value-driven crowdshipping, *congestion* is expected to decrease due to less delivery vans on the road (Arslan et al., 2019; McKinnon, 2016; Rougès & Montreuil, 2014). However, in profit-driven crowdshipping, it could also increase due to detours and dedicated drivers. In value-driven crowdshipping, *nuisance* is expected to decrease, especially regarding noise (Buldeo Rai et al., 2017). However, in profit-driven crowdshipping, it could increase due to detours and dedicated drivers. Third, *social cohesion* is expected to improve because of courier and customer communication (Frenken & Schor, 2019; Paloheimo et al., 2016). However, this is mainly among early adopters, and it is expected to decrease. Furthermore, in profit-driven crowdshipping, crowdshipping may have a negative impact on social cohesion, as people do not want to carry a package for family and friends, when they know they could also receive money for this (Frenken & Schor, 2019). Fourth, the crowdshipping impacts a *healthy lifestyle* by promoting the bicycle or walking as delivery mode (Binetti et al., 2019; Rougès & Montreuil, 2014). Additionally, in value-driven crowdshipping, the decreasing pollutant emissions may have physical consequences on public health (Buldeo Rai et al., 2018).

Needs and desires of customers regarding package delivery. Due to a lower transport resistance, the needs and desires of customers are fulfilled better than in the original situation. Namely, crowdshipping offers cheaper, more sustainable, faster, more flexible, easier, more personal, and traceable delivery (Le et al., 2019; Rougès & Montreuil, 2014).

Resources. It was argued that the *volume, composition of traffic and transport, division over time and space* can either increase (in profit-driven crowdshipping) or decrease (in value-driven crowdshipping). Similarly, the *resources* required will either increase (in value-driven crowdshipping) or decrease (in profit-driven crowdshipping). Nevertheless, in case of modality shift to greener transport modes, crowdshipping is expected to cause less fuel consumption (Buldeo Rai et al., 2017; Frenken & Schor, 2019) and therefore lower delivery costs (Acquier et al., 2017; Strulak-Wójcikiewicz & Wagner, 2021). The delivery price will never exceed the current situation because the current LSP options will still be available.

Environment. The environmental impact is directly caused by the resources used. If the resources used decrease (in value-driven crowdshipping), the main advantages are less CO_2 emissions and less air pollution (Buldeo Rai et al., 2017; Rougès & Montreuil, 2014). However, detours and dedicated drivers (in profit-driven crowdshipping) are disadvantageous for the environment. Moreover, the modal shift from delivery vans to passenger cars, public transport, biking, or walking, is less harmful for the environment (Buldeo Rai et al., 2018).

Industry. The lower delivery costs provide an incentive for the crowdshipping industry to emerge. First, it provides *income opportunities* for couriers (Le et al., 2019; Rougès & Montreuil, 2014) with much flexibility. In profit-driven crowdshipping, it reduces unemployment (Triki, 2021). A survey with university students in Rome showed a high willingness to become a courier, namely 87%. However, the negative impact of these income opportunities for couriers in profit-driven crowdshipping is the lack of social protection. Namely, oftentimes couriers lack an employment contract, and thus receive no protection and risk exploitation (Marcucci et al., 2017). Also, their income is unreliable and they are not allowed to voice their opinions towards the platform, or enjoy parental leave or education opportunities (FNV, 2020). Second, the *network efficiency* is expected to improve because usage is made of excess vehicle capacity and the new potential modalities such as public transport, walking or biking (Carbone et al., 2017). However, network efficiency decreases due to the lack of consolidation (Carbone et al., 2017; Dablanc et al., 2017), potential detours and dedicated couriers in profit-driven crowdshipping (Buldeo Rai et al., 2018; Ghaderi et al., 2022). Moreover, network efficiency heavily depends on the matching algorithms used (Triki, 2021). Third, *competitiveness* is applicable to profit-driven crowdshipping. It is expected to improve when the industry grows. Companies will aim to minimise costs and maximise operational flexibility (Botsman, 2014). This positively impacts the *network efficiency*. Fourth, literature is inconsistent about the impact on *traditional LSPs*. Paloheimo et al. (2016) argue that crowdshipping addresses a latent need and does thus not impact traditional logistics service providers. This is endorsed by Rougès and Montreuil (2014). However, Frenken and Schor (2019) point out that in the global North, new activities will allegedly increase demand, rather than substitute other demand. Thus, Buldeo Rai et al. (2017) considers crowdshipping disruptive for traditional LSPs. For this reason, it can be expected that the performance and efficiency of traditional LSPs decrease due to lower demand.

5.5. Societal impacts over time
As described before, the diagrams for value-driven and profit-driven crowdshipping were constructed assuming that crowdshipping was successfully implemented, but it was still a niche. Four future changes might be relevant to the evolution of societal impacts over time. First, the development of *industry* might be the biggest change. E-commerce is expected to grow (Mucowska, 2021), which might cause more companies to be interested in crowdshipping. Potentially, traditional LSPs might want to integrate crowdshipping (Carbone et al., 2017). However, LSPs are not known to be very innovative (Bellingkrodt & Wallenburg, 2013). Next, the steep growth of Uber showed that sharing platforms are able to become customer's primary sources of transport (Ghaderi et al., 2022; Hasselwander et al., 2021). This steep growth might encourage a monopoly in profit-based crowdshipping. Second, the *way of using vehicles* may change even more. In the recent years, the purpose of vehicles has already changed. People may shift towards rental cars instead of personal cars (Carbone et al., 2017). Arvidsson et al. (2016) envisions synergies between passenger and freight transport. Third, due to the growth of industry and e-commerce, the *crowd* may grow. This impacts the network efficiency, resources, and environmental impacts. Additionally, couriers and customers acquire ratings over time (Frenken & Schor, 2019), which improves network efficiency. However, Paloheimo et al. (2016) found that novelty was an important motivation for couriers. Therefore, the courier base may also decrease. Fourth, expansion of crowdshipping to *rural areas* can be expected because of environmental and economic benefits (Buldeo Rai et al., 2018; Erickson & Trauth, 2013).

5.6. Interpretation of results
The most interesting deliverable of the literature review into crowdshipping are the societal impacts, shown in Figure 5.1. The direct impacts of crowdshipping are on *accessibility*; *safety, risk, and privacy*, and *way of using vehicles*. In turn, they impact other impacts. It can be concluded that the manner in which crowdshipping is implemented determines the overall positive or negative societal impact. Two

main scenarios are possible for the bottom half of the diagram. First, if crowdshipping is done by travellers, it is called *value-driven crowdshipping* because it departs from values such as sustainability and community-spirit. Travellers make only a small detour using sustainable modes of transport (e.g. biking or walking), making more efficient use of already available space, this will lead to societal benefits. Namely, there will be less delivery vans and lower delivery costs due to less fuel consumption. This positively impacts the environment and liveability. However, the second scenario regards dedicated drivers and is called *profit-driven crowdshipping*. These dedicated drivers lead to less efficient delivery because packages are not consolidated and a trip is made especially for one package. This has a negative impact on resources, the environment, and liveability.

Next, disregarding value-driven or profit-driven crowdshipping, the upper half of the diagram shows that customers want more, more flexible, and cheaper delivery. The industry aims to facilitate this. Thus, crowdshipping will lead to increased competitiveness and network efficiency. However, crowdshipping may take over some demand that would otherwise be supplied by traditional LSPs. Therefore, they become less efficient. However, crowdshipping may also address a latent need (Paloheimo et al., 2016), and the Jevons paradox could occur (Jevons, 1865). Then, there is no impact on traditional LSPs.

Finally, disregarding value-driven or profit-driven crowdshipping, there are negative societal impacts that will happen nevertheless. Namely, the usage of a crowd of (unknown) couriers leads to a decrease of safety and privacy and an increase of risk.

It can thus be argued that in general, value-driven crowdshipping yields more positive societal impacts than profit-driven crowdshipping. The biggest difference regards the fact that dedicated drivers in profit-driven crowdshipping increase the volume, creating a negative impact on resources, environment, and liveability. However, value-driven crowdshipping also has negative impacts on society. These impacts regard safety, risk, and privacy. Moreover, in general, it is expected to address a latent need, thus increasing the demand. This diminishes the positive impacts on resources, environment, and liveability. The biggest difference between value-driven and profit-driven crowdshipping lies with the courier. Therefore, the following analysis will focus on identifying the power, interests, motivation, and problems of the couriers.

6

Analysis: Stakeholder analysis

The goal of the stakeholder analysis is to identify the stakeholders' interests and power, and how this influences the way in which crowdshipping could be implemented and thereby the SFFs. A distinction is made between value-driven and profit-driven crowdshipping. First, stakeholders and their profile, motivation, and problems are identified based on literature. Second, the issue is formulated by constructing a PI grid, stakeholder influence diagram, and bases of power - directions of interest diagrams. Third, as part of the proposal development, review, and adoption step, the stakeholder support vs. opposition grid is constructed. The Chapter ends with an interpretation of the results.

This thesis distinguishes between value-driven and profit-driven crowdshipping. However, this distinction has not previously appeared in literature. Therefore, the stakeholder identification in Section 6.1 does not distinguish between the two manners as it is a reflection on literature. The Sections thereafter are a careful analysis according to the method by Bryson (2004), and for that reason, it is possible to make the distinction based on critical reasoning. Thus, the diagrams will be created for both manners separately.

6.1. Stakeholder identification based on literature
Three main stakeholders can be identified: the customer, who wants their package delivered; the courier, who delivers the package; and the platform, who coordinates supply and demand. Additionally, the potential role of local governments will be considered. This was done because the previous analysis showed a potential positive impact on liveability, which local governments might be interested in.

Some scholars identify more stakeholders than the previously mentioned four. However, it was decided not to include them in this thesis. For instance, Rougès and Montreuil (2014) identify society as a stakeholder. Society was not included because the societal impacts of crowdshipping were already discussed extensively in the previous chapter. Next, Buldeo Rai et al. (2018) identify traditional LSPs. They were not included here because their interests either match with the platform role mentioned before, or the impact on their current business was described in the previous chapter.

Next, the profile, motivation, and problems of the four identified stakeholders based on literature are shown in Table 6.1. The details are discussed below.

6.1.1. Customer
Profile. Customers can be characterised as young people, mostly male, who work full-time (Punel et al., 2018). They do not ship with LSPs on a daily basis (Reister, 2011).

Motivation. They may have a wide variety of motivations to participate in crowdshipping. First, they might be motivated by the lower price (McKinnon, 2016; Wicaksono et al., 2021). Second, environmental concerns play a large role (Kourounioti et al., 2021). Third, community spirit is a motivation (Punel et al., 2018). Fourth, crowdshipping promises fast, convenient, and more personal delivery (Buldeo Rai et al., 2017; Rougès & Montreuil, 2014). Fifth, through crowdshipping, customers receive access to products that were unavailable before (Rougès & Montreuil, 2014). This applies to products that are for instance odd-sized or fragile, or living animals. Sixth, customers indicate that they prefer to pay a

	Profile	Motivation	Problems
Customer	• Young people, male, full-time employed • Not those who ship daily with LSPs	• Lower delivery price • Environment • Community spirit • Fast, convenient, and more personal delivery • Access to products that were unavailable before • Preference to pay a person rather than a company • Innovation	• Trust and safety issues • Privacy and security • Lower service quality • Less likely to be able to ship a package long-distance, or to request strict delivery deadlines • Low availability of couriers, especially in peak times (e.g. holidays) • Might stimulate unsustainable consumer behaviour such as indulgent consumption
Courier	• Commuters travelling for leisure or with more flexible schedules • No certified delivery drivers • Young people, male, full-time employed • Social media usage	• Extra income • Environment • Community spirit • Exercise • Trying something new • Meeting new people and try new lifestyles • Job flexibility	• Need for a minimum number of deliveries to make it financially worthwhile and to gain an adequate online rating • Vulnerable position as non-recognised employees: financial insecurities, lacking social protection, isolation, stress, overlap between work and private life, rivalry, uncertainties, exposure to exploitation • High fees compared to the required time, effort, and risk • Discouraged by additional travel time, heavy packages, or low remuneration • Trust and safety issues
Platform	• Market mediation function • Urban deliveries	• Gaining profit or generating human touch and improving social ties • Environmental concerns • Political commitments • Ensuring user's satisfaction, delivery safety, and security	• Trust, safety, security: who is responsible? • Chicken-and-egg problem • Difficulties with matching and routing, demand forecasting etc. • Governmental regulations or legal issues
Local governments	• May play a key role as guarantor of the credibility	• Increasing sense of community • Environment • Decreasing traffic jams in cities • Creating job opportunities • Stimulating exercise	• Jevons paradox

Table 6.1. General overview of stakeholders' profile, motivation, and problems

person rather than an LSP for their delivery service (Strulak-Wójcikiewicz & Wagner, 2021). Finally, the innovativeness of crowdshipping attracts customers (Carbone et al., 2017).

Problems. The biggest problem customers might experience are trust and safety issues (Cheng et al., 2022; Punel et al., 2018; Rougès & Montreuil, 2014). This relates to trusting that the unknown courier will safely and without damage deliver the package. Second, couriers will need to share personal data (e.g. home address), which poses privacy and security problems (Le et al., 2019). It is seen as an important determinant of collaborative consumption (Bardhi & Eckhardt, 2012). Third, the unknown courier might provide lower service quality than a traditional LSP driver (Rougès & Montreuil, 2014). Fourth, due to a smaller courier crowd, customers are less likely to be able to ship a package long distance, or to request strict delivery deadlines (Ermagun & Stathopoulos, 2018). Fifth, customers are affected by a low availability of couriers, especially in peak times (Buldeo Rai et al., 2017). Finally, crowdshipping might stimulate unsustainable consumer behaviour, such as indulgent consumption (Parguel et al., 2017).

6.1.2. Courier
Profile. The courier group is formed by commuters who travel for leisure, or have more flexible schedules (Le et al., 2019). They are no certified delivery drivers (Hodson, 2013). Similar to customers, the are often characterised as young people, male, who have a full-time job (Punel et al., 2018). As they are often recruited through social media (Le & Ukkusuri, 2019), this is an imperative characteristic.

Motivation. Extra income is an important motivation for couriers (Cheng et al., 2022; McKinnon, 2016). Then, similar to customers, couriers are attracted by environmental benefits (McKinnon, 2016; Punel et al., 2018) and community spirit (Lin et al., 2020). The driver of environmental spirit is the common

belief that industry needs to change in order to meet the goals in the Paris Agreement (Thurner et al., 2022; Van Wingerden, 1979). Fourth, couriers see crowdshipping as a manner to exercise when they take the bicycle or walk (Paloheimo et al., 2016). Fifth, couriers like to try something new (Paloheimo et al., 2016). This could be because they are more likely to be early adopters (Rogers, 2010). Related to this, couriers indicate that crowdshipping allows them to meet new people and try new lifestyles (Frenken & Schor, 2019; Hodson, 2013). Finally, job flexibility is an important motivation for couriers (Rougès & Montreuil, 2014).

Problems. First, as couriers are not dedicated to crowdshipping, they need to make a minimum number of deliveries per month to make it financially worthwhile. Second, it is necessary to gain an adequate online rating to satisfy (most) users (McKinnon, 2016). Third, in profit-driven crowdshipping, their flexible job and income might cause financial insecurities, lacking social protection, isolation, stress, overlap between work and private life, rivalry between couriers, uncertainties due to short-term schedules, and risk exploitation (De Groen & Maselli, 2016; European Commission, 2021). Fourth, couriers need to pay fees to the platform provider. These fees might be high given the necessary time, effort, and risk of delivery (McKinnon, 2016). Fifth, additional travel time, heavy packages, or low remuneration might prevent them from accepting crowdshipping tasks (Wicaksono et al., 2021). A driver could be the low perceived ease of use according to the Technology Acceptance Model by Davis et al. (1989). Finally, couriers might unknowingly carry an illegal or hazardous package, causing trust and safety issues (Rougès & Montreuil, 2014).

6.1.3. Platform
Profile. The platform has a market mediation function (Carbone et al., 2017). They often focus urban deliveries in order to reach a larger customer and courier base (Le et al., 2019; Rougès & Montreuil, 2014).

Motivation. For business-oriented companies, economic factors are the main criterion (Rougès & Montreuil, 2014). Crowdshipping provides an opportunity of gaining profit because delivery and operating costs are lower than in traditional LSPs (Cheng et al., 2022). On the other hand, community-oriented companies focus on human touch and trust. These companies aim to improve social ties (Carbone et al., 2017; Rougès & Montreuil, 2014). Both types of companies can be driven by environmental concerns (Carbone et al., 2017). Moreover, political commitments are mentioned as motivations (Carbone et al., 2017). Finally, Le et al. (2019) states that the objective of the platform is to ensure user's satisfaction, delivery safety, and security.

Problems. The first problem is a result of the trust, safety, and security problems between courier and customer. The platform plays a role in tackling or taking responsibility for these problems (Rougès & Montreuil, 2014). Second, the platform deals with the chicken-and-egg problem: a critical mass of couriers is needed to ensure fast, flexible, and cheaper delivery, and to attract customers. But a critical mass of customers is needed to attract couriers (Rougès & Montreuil, 2014). Third, the platform is responsible for matching and routing, as well as demand forecasting, targeting and recruiting couriers (Le et al., 2019; Prassl & Risak, 2015; Rougès & Montreuil, 2014). Fourth, (lacking) governmental regulations or legal issues might cause problems that should be resolved by the platform (Le et al., 2019).

6.1.4. Local governments
Profile. The local government may play a key role as guarantor of the credibility of crowdshipping, anticipating on the trust, safety, and security problems between couriers and customers (Paloheimo et al., 2016).

Motivation. Crowdshipping may bring advantages that are valuable for local governments. First, crowdshipping aims to increase the sense of community (Lin et al., 2020). Second, local governments are interested in the environmental benefits (McKinnon, 2016; Punel et al., 2018). Third, crowdshipping may help decrease congestion in cities (Rougès & Montreuil, 2014). Fourth, crowdshipping creates job opportunities (Rougès & Montreuil, 2014). Fifth, crowdshipping stimulates couriers to exercise (Paloheimo et al., 2016).

Problems. The main problem can be described as the Jevons paradox (Jevons, 1865): while crowd-shipping may encourage more efficient utilisation of resources, this may also create a higher demanded volume. Therefore, it may end up not being beneficial for the e.g. environment or congestion.

6.2. Issue formulation

The previous section showed that each stakeholder may have different problems when participating in crowdshipping. This section aims at formulating the main stakeholder issue. This is done through constructing a PI grid, stakeholder influence diagram, and bases of power - directions of interest diagrams for value-driven and profit-driven crowdshipping separately.

6.2.1. PI grid

PI grids are useful in assessing which stakeholders' interest and power bases must be taken into account to address the issue. The PI grid is a two-by-two matrix, showing the stakeholder's power to affect crowdshipping on the x-axis, and their interest in crowdshipping on the y-axis. This results in four categories: *players* have high power and significant interest, *subjects* have an interest but little power, *context setters* have power, but little interest, and the *crowd* has little interest and little power (Bryson, 2004). The crowd in the PI grid should not be confused with the couriers in crowdshipping.
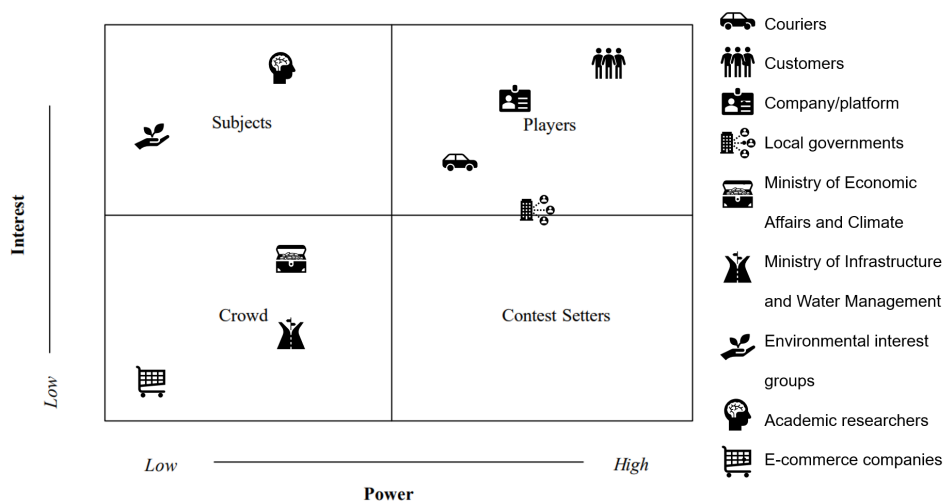
Figure 6.1: PI grid for value-driven crowdshipping

Now, the power and main interests of the four main stakeholders will be explained. The PI grids are shown in Figure 6.1 for value-driven crowdshipping and for profit-driven crowdshipping in Figure 6.2. They will be explained together, only mentioning the differences when relevant. First, the *couriers* have a medium-high interest and power in value-driven crowdshipping and a high interest and power in profit-driven crowdshipping. Their main interests are the environmental and community benefits in value-driven crowdshipping, and gaining extra income in profit-driven crowdshipping (Cheng et al., 2022; McKinnon, 2016). The courier's power is relatively high, because they form the supply. However, they are less powerful than customers, who set the conditions for the couriers (Buldeo Rai et al., 2017). Second, the *customers* have high interest and high power. In value-driven crowdshipping, their interest is slightly higher than in profit-driven crowdshipping due to the environmental and community benefits. Customers are mainly interested in the lower price (McKinnon, 2016; Wicaksono et al., 2021) and environmental benefits (Kourounioti et al., 2021). Their power is high because their origin-destination demands highly impact the routing and matching efficiency (Le et al., 2019). In turn, this affects other stakeholders, making customers the most powerful stakeholder. Third, the *platform* has high interest and high power. They are more interested in profit-driven crowdshipping than value-driven crowdshipping because of the higher economic opportunities crowdshipping (Rougès & Montreuil, 2014). Their power includes targeting attracting customers and couriers, matching and routing, demand forecasting (Le et al., 2019; Prassl & Risak, 2015; Rougès & Montreuil, 2014). Additionally, they may choose to
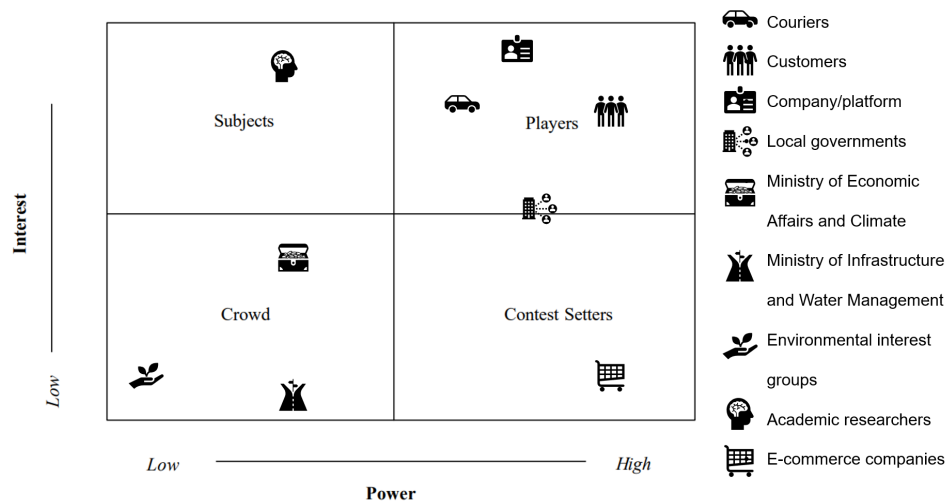
Figure 6.2: PI grid for profit-driven crowdshipping

implement additional features to the platform (Le et al., 2019; Mladenow et al., 2016). Thus, they highly influence the platform's efficiency. Fourth, the *local governments* are moderately interested and have high power in value-driven crowdshipping. Their interests are mainly related to the sense of community (Lin et al., 2020), environmental benefits (Rougès & Montreuil, 2014), and congestion (Rougès & Montreuil, 2014). The societal impacts diagram in Figure 5.1 showed that value-driven crowdshipping could have a positive effect on society. They are less interested in profit-driven crowdshipping due to the expected negative societal impacts. Furthermore, the local governments have two types of power. First, they have an important influence on future policy. For instance, they might enact policies banning motorised vehicles in city centres. This is highly influential on profit-driven crowdshipping. Second, their power lies within resolving the trust issue encountered by customers and couriers. The involvement of local governments can be crucial in transport innovations (Van Wee et al., 2004). Namely, involvement of local governments could create trust, avoid conflicts of interests, and ensure the processes are initiated smoothly (Binetti et al., 2019).

In addition to the four stakeholders described earlier, five more stakeholders were added to comprise the entire spectrum of powerful or interested stakeholders. The added stakeholders are the following. First, the *Ministry of Economic Affairs and Climate Policy* has low interest and low power. They are mainly interested in the economic and environmental benefits of crowdshipping in profit-driven and value-driven crowdshipping, respectively (Rijksoverheid.nl, n.d.-a). Their power regards stimulating crowdshipping through policy and potentially supporting businesses (Rijksoverheid.nl, n.d.-a). Second, the Ministry of Infrastructure and Water Management is less interested but equally powerful as the previous ministry. They are mostly interested in the modal shift of last mile delivery and environmental benefits in case of value-driven crowdshipping (Rijksoverheid.nl, n.d.-b). They are not interested in profit-driven crowdshipping. Their power regards policy making and potentially adjusting rules and regulations. Third, *environmental interest groups* have high interest but low power in value-driven crowdshipping. They are interested in the environmental benefits. However, their only power regards influencing the sanctioned discourse. In profit-driven crowdshipping, they have no interest, nor power. Fourth, *academic researchers* have high interest but low power. The high interest is indicated by the rising number of published articles in recent years (Mucowska, 2021). Their power regards improving the technology (e.g. routing-and-matching algorithm development), but these are not the greatest barriers of crowdshipping. Therefore, the power of the academic researchers is limited. Fifth, large e-commerce companies such as Bol.com are not very interested in profit-driven crowdshipping because to them because the current delivery methods are already satisfactory. However, they are powerful because they create demand. In value-driven crowdshipping, they are not powerful, nor interested because they will most likely not be involved.

6.2.2. Stakeholder influence diagram
Next, the stakeholder influence diagram shows how the stakeholders in a PI grid influence each other (Bryson, 2004). It builds upon the existing PI grid and is shown in Figure 6.3 for value-driven crowdshipping, and in Figure 6.4 for profit-driven crowdshipping.
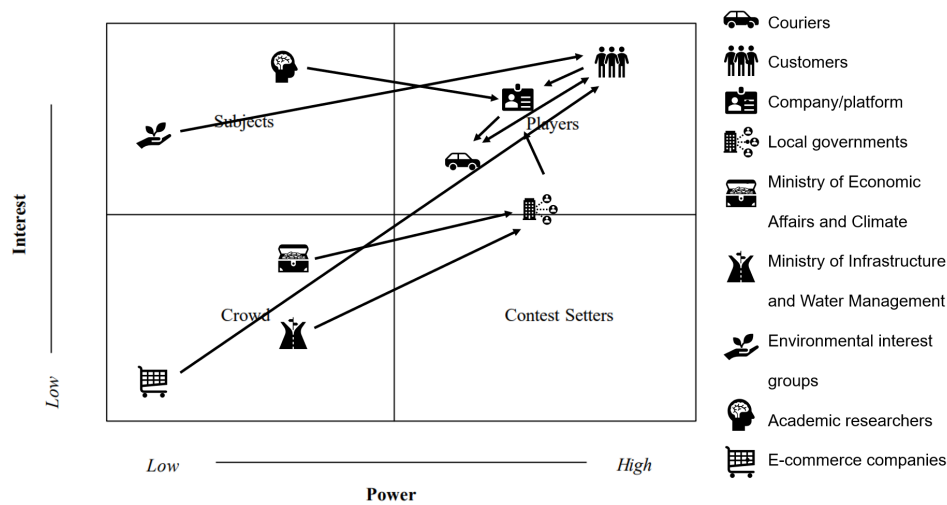
Figure 6.3: PI grid, extended to stakeholder influence diagram for value-driven crowdshipping
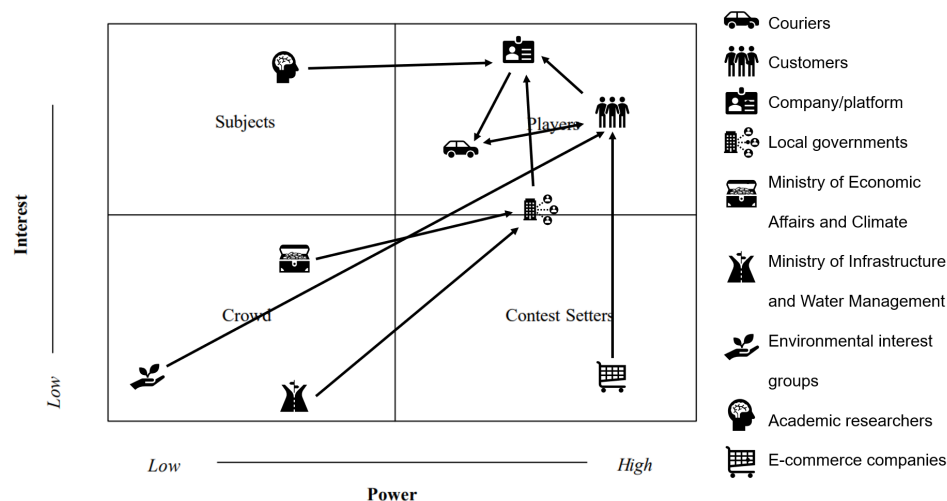
Figure 6.4: PI grid, extended to stakeholder influence diagram for profit-driven crowdshipping

The Figures show nine important stakeholder influences by means of arrows. This discussion starts with the customers because they are the key influencer. First, the customer and the couriers influence each other due to their communication about the package size, the remuneration, delivery time window, or additional requests. These communications affect the degree of trust, safety, and privacy experienced by both parties. Second, the customers influence the platform in setting delivery conditions (Buldeo Rai et al., 2018). This influence indirectly influences the couriers, shown by the arrow between the platform and couriers. Fourth, environmental interest groups influence the sanctioned discourse, and thus the customers. They might encourage customers to participate in value-driven crowdshipping, and discourage them in case of profit-driven crowdshipping. Fifth, the academic researchers influence the platform because research into crowdshipping may help them optimise their business (e.g. routing-and-matching optimisation or marketing). Sixth and seventh, the Ministry of Economic Affairs and Climate Policy, and the Ministry of Infrastructure and Water Management influence the local governments because they can develop policies favouring value-driven crowdshipping or hindering profit-driven crowdshipping. Eight, when local governments implement these policies, this will affect

the crowdshipping companies. Ninth, the e-commerce companies encourage customers to buy more products, which increases demand.

6.2.3. Bases of power - directions of interest diagrams

The bases of power - directions of interest diagrams show the sources of power related to the interests of each stakeholder. These diagrams were constructed for the four most important stakeholders for value-driven and profit-driven crowdshipping separately. Customers are shown in Figures 6.5a and 6.5b, couriers in Figures 6.6a and 6.6b, the platform in Figures 6.7a and 6.7b, and the local governments in Figure 6.8. For the last stakeholder, no difference is made between value-driven and profit-driven crowdshipping because the PI grids showed that their power and interests are the same.

The theory behind these diagrams is shown in Figure B.2. These diagrams have two goals. First, they help find common ground between all stakeholders for value-based crowdshipping. Second, insight will be gained into how each stakeholder influences the implementation of crowdshipping. The diagrams are constructed as follows. The bases of power are shown on the bottom, with arrows pointing at the stakeholder. This shows what powers might affect implementation of crowdshipping (Bryson, 2004). It consists of support mechanisms (e.g. money or votes) on the left and available sanctions (e.g. regulatory authority) on the right (Eden & Ackermann, 1998). Then, the directions of interest show the stakeholder's interests in relation to implementation of crowdshipping. Specifically, the directions of interest are shown on top in the middle, with arrows pointing from the stakeholder. The top left boxes show the stakeholder's view of crowdshipping implementation on their aspirations. The top right boxes show the stakeholder's lenses to interpret crowdshipping implementation. Now, the details of each diagram will be discussed separately. However, no elaboration on the directions of interest will be provided because they were explicitly explained in Section 6.1 and Table 6.1.

(a) Value-driven crowdshipping

(b) Profit-driven crowdshipping
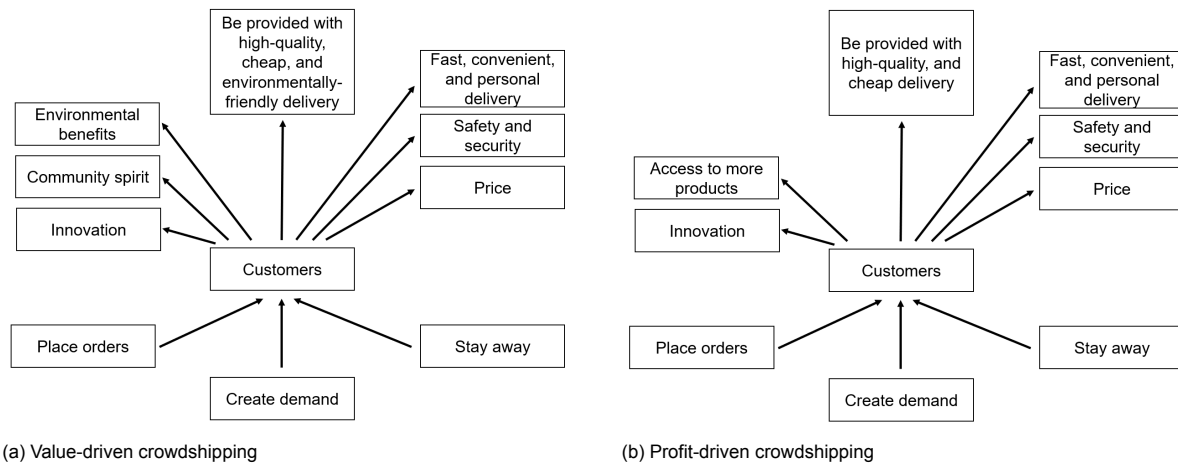
Figure 6.5: Bases of power - directions of interest diagram for **customers**

Figure 6.5a shows the bases of power - directions of interest diagram for **customers**. The previous analyses showed that the customers, forming the demand, have an important role in setting the conditions towards the platform. This is shown by three bases. Their support mechanism is to place orders. Their available sanctions are to stay away. Thus, the base of power is to create demand. Next, it can be seen that their view of the impact of crowdshipping implementation on their aspirations is that it has environmental benefits in case of value-drive crowdshipping; fulfils their community spirit in case of value-driven crowdshipping; provides them with access to products that were unavailable before in case of profit-driven crowdshipping; and helps fulfil their desire for innovation. Then, they assess crowdshipping in terms of fast, convenient, and personal delivery; safety and security; and price. Thus, the direction of interest is to be provided with high-quality, cheap, and environmentally-friendly delivery. It can be concluded that customers have different reasons to be interested in value-driven and profit-driven crowdshipping.

Figure 6.6a shows the bases of power - directions of interest diagram for **couriers**. The previous

(a) Value-driven crowdshipping

(b) Profit-driven crowdshipping
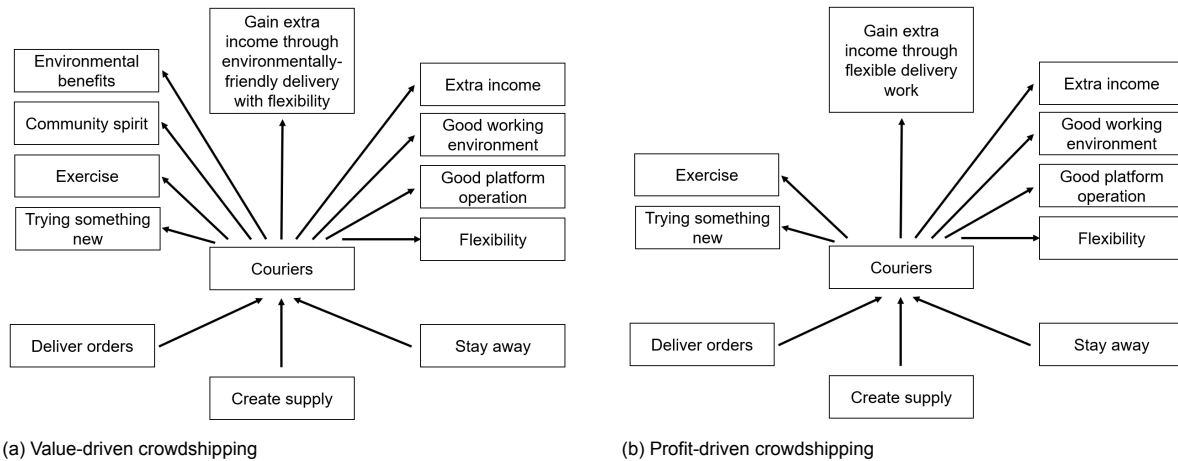
Figure 6.6: Bases of power - directions of interest diagram for **couriers**

analyses showed that the couriers do not have much influence on the conditions of the platform. However, they have an important role as they create supply. This is shown by three bases. Their support mechanism is to deliver orders. Their available sanctions are to stay away. Thus, the base of power is to create supply. Next, it can be seen that their view of the impact of crowdshipping implementation on their aspirations is that it has environmental benefits in case of value-driven crowdshipping; fulfils their community spirit in case of value-driven crowdshipping; gives opportunity for exercise; and allows to try something new. Then, they assess crowdshipping in terms of how much extra income they can gain, in a good working environment, with good platform operation, while maintaining their flexibility. Thus, the direction of interest is to gain extra income through environmentally-friendly delivery with flexibility. It can be concluded that couriers have different reasons to be interested in value-driven and profit-driven crowdshipping.

(a) Value-driven crowdshipping

(b) Profit-driven crowdshipping
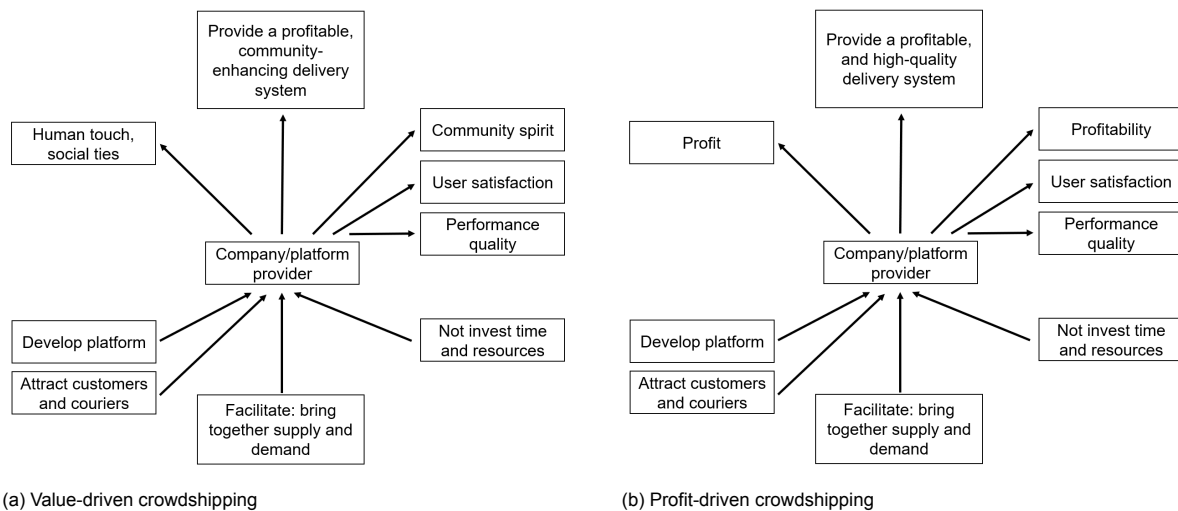
Figure 6.7: Bases of power - directions of interest diagram for **platform**

Figure 6.7a shows the bases of power - directions of interest diagram for the **platform**. The previous analyses showed that the platform is where supply and demand meet. The support mechanism shows that the platform has two important roles, namely to develop the platform and to attract customers and couriers. Develop entails that the platform will initiate and improve the platform according to what is needed. The available sanctions are if the platform does not invest the time and resources needed for the platform to function well. Thus, the main base of power is facilitating: bringing together supply and demand. Next, it can be seen that their view of the impact on crowdshipping implementation on

their aspiration is that it will give them profit in case of profit-driven crowdshipping, and it helps increase human touch and social ties in case of value-driven crowdshipping. Then, they assess crowdshipping in terms of profitability in case of profit-driven crowdshipping; community spirit in case of value-driven crowdshipping; user satisfaction; and performance quality. Thus, the direction of interest is to provide a profitable (in case of profit-driven crowdshipping), community-enhancing (in case of value-driven crowdshipping), and high-quality delivery system. Similar to the PI grid, it can be concluded that the platform is more interested in profit-driven than in value-driven crowdshipping.
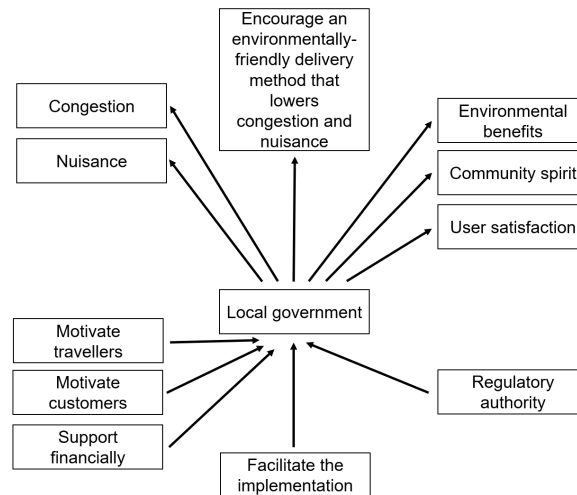
Figure 6.8: Bases of power - directions of interest diagram for **local government** for value-driven and profit-driven crowdshipping

Figure 6.8 shows the bases of power - directions of interest diagram for the **local government**. The previous analyses and literature (Paloheimo et al., 2016; Van Wee et al., 2004) showed that the local government may play a key role as guarantor of the credibility of crowdshipping. The support mechanism shows that the local government has three important goals, namely to motivate travellers; motivate customers; and support financially. The available sanctions relate to regulatory authority. For instance, the municipality of Amsterdam has shown that it wants to avert so-called dark stores from flash-delivery companies (Volkskrant, 2022). Thus, the main base of power is that it facilitates the implementation. Next, it can be seen that their view of the impact of crowdshipping implementation on their aspiration is that it will decrease congestion and nuisance in cities. Then, they assess both value-driven and profit-driven crowdshipping in terms of environmental benefits; community spirit; and user satisfaction. Thus, the direction of interest is to encourage an environmentally-friendly delivery method that lowers congestion and nuisance. Similar to the conclusions from the societal impacts, it can be concluded that the local government is more interested in value-driven crowdshipping than profit-driven crowdshipping.

6.3. Proposal development, review, and adoption

The previous step, issue formulation, aimed at identifying and understanding stakeholders and their interests. The current step focuses on developing proposals that can receive the required support. It is done through a stakeholder support vs. opposition grid

6.3.1. Stakeholder support vs. opposition grid

The stakeholder support vs. opposition grid assesses specific proposals in terms of stakeholder support, opposition, and importance. Because the ministries, environmental interest groups, and academic researchers are less important, only the four main stakeholders will be considered. Two proposals will be assessed, namely value-driven and profit-driven crowdshipping. These proposals were selected because they are both on one end of the societal impacts seen in Figure 5.1. Also, they differ greatly regarding which aspects are valued. These proposals are as follows.

The first proposal is called *value-driven crowdshipping*. Crowdshipping implementation will depart from environmental benefits, community-spirit, and health benefits. *Customers* may have to wait a bit
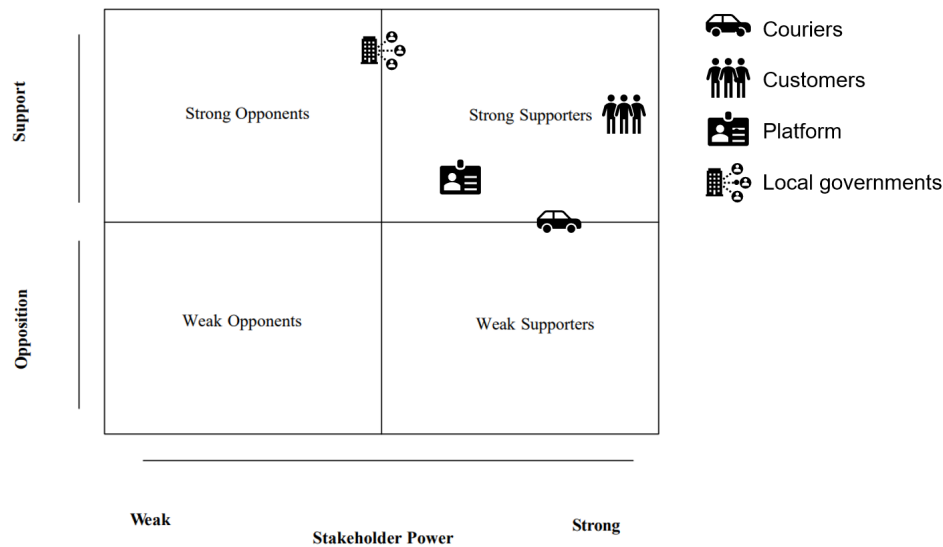
Figure 6.9: Stakeholder support vs. opposition grid for *value-driven* crowdshipping

longer for their products because routing and matching must be optimised. *Couriers* will mainly participate based on non-economic factors. They are encouraged to use sustainable and healthy forms of transport. The *platform* optimises routing and matching. They keep the environmental benefits, community-spirit, and health benefits in mind. They receive little to no profit. The *local governments* support this initiative by smoothing the path with their regulatory authority. The stakeholder support vs. opposition grid is shown in Figure 6.9 and will be discussed below.

Local governments are the biggest supporter of this proposal due to the positive societal impacts (e.g. less congestion (Arslan et al., 2019; Rougès & Montreuil, 2014), environmental benefits (Buldeo Rai et al., 2017; Rougès & Montreuil, 2014), and greener and healthier modes of transport (Buldeo Rai et al., 2018)). However, they are not very powerful because they can only facilitate the proposal. Next, the *customers* are also supportive of this proposal. For them, it provides an extra potential delivery method to choose from. They also value the positive impact on the environment (Buldeo Rai et al., 2017; Rougès & Montreuil, 2014) and social cohesion (Frenken & Schor, 2019; Paloheimo et al., 2016). They are very powerful because they form the supply. Then, the platform is less supportive. The platform values the same things as the customers. However, in the end, some profit needs to be made. This is more difficult with this proposal. The platform is less powerful because they need the customers and couriers. Finally, the couriers are in between support and opposition. They acknowledge the societal benefits but do not want to invest much time and effort (Lin et al., 2020; McKinnon, 2016).

The second proposal is called *profit-driven crowdshipping*. Crowdshipping implementation will depart from an economic perspective. Anything is possible for the customer, e.g. specific delivery times or conditions. The customer pays according to supply and demand. The courier is profit-driven and accepts crowdshipping tasks if they are economically viable. The platform is also profit-driven and aims at high margins. The local government is not involved in crowdshipping, but they are affected by it. The stakeholder support vs. opposition grid is shown in Figure 6.10 and will be discussed below.

The platform is the biggest supporter of this proposal. They are profit-driven and see this as a way to earn money. They have relatively strong power because they design the platform and operations (e.g. revenue models, routing-and-matching, stimulating certain modes) (Buldeo Rai et al., 2018). However, they are not as powerful as the couriers and the customers, who form supply and demand (Buldeo Rai et al., 2018). Without them, the platform cannot be a business. The couriers are in between support and opposition. Namely, they like the extra income (Cheng et al., 2022). However, it is not an ideal source of income for them, because it is flexible and insecure, there is risk of exploitation, and they do
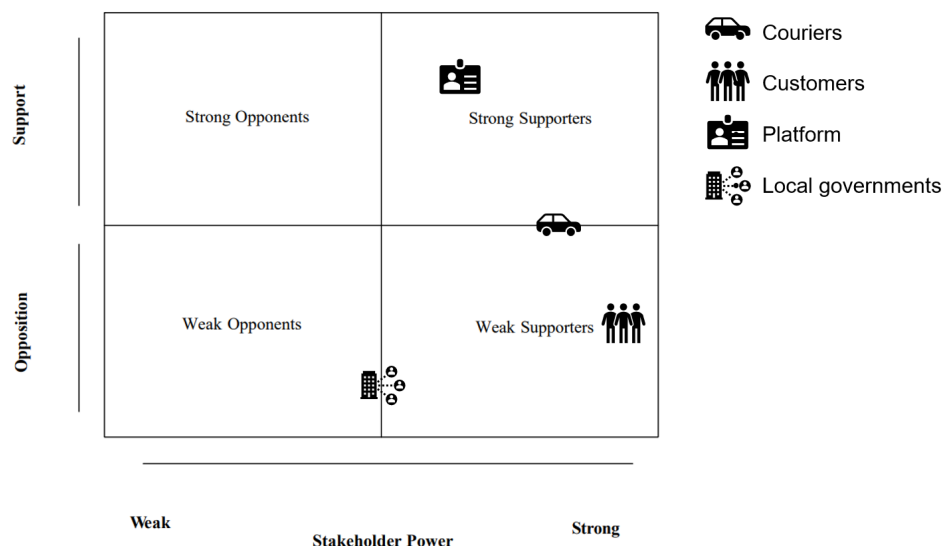
Figure 6.10: Stakeholder support vs. opposition grid for *profit-driven* crowdshipping

not receive benefits as they are not officially employed (De Groen & Maselli, 2016). The customers are opposed to this proposal because of the negative societal impacts this form of crowdshipping causes (e.g. increased fuel consumption and emissions due to detours (Buldeo Rai et al., 2018; Ghaderi et al., 2022) or the lack of consolidation (Kafle et al., 2017)). They have strong power because they form the supply. The local governments are also opposed to this proposal because of the same negative societal impacts.

6.4. Interpretation of results

The goal of the stakeholder analysis was to gain more insight into the couriers' power, interests, motivations, and problems. Because the various stakeholders influence each other, the customers, platform, and local government were included as well. First, the stakeholders' interests and power are as follows. It can be seen that the customers, couriers, local governments, and the platform are interested in crowdshipping. The *courier*'s main interest is gaining extra income in case of profit-driven crowdshipping (Cheng et al., 2022; McKinnon, 2016). In value-driven crowdshipping, they are motivated by environmental and community spirit. In both manners, their power is high because they form the supply. The *customer*'s main interests are the lower price (McKinnon, 2016; Wicaksono et al., 2021) and environmental benefits in case of value-driven crowdshipping (Kourounioti et al., 2021). Their power is high because their origin-destination demands highly impact the routing and matching efficiency (Le et al., 2019). They are more powerful than couriers, because customers set the conditions for the couriers (Buldeo Rai et al., 2017). The *platform* is interested in economic opportunities in case of profit-driven crowdshipping (Rougès & Montreuil, 2014). They are powerful because they attract customers and couriers, do matching and routing, and demand forecasting (Le et al., 2019; Prassl & Risak, 2015; Rougès & Montreuil, 2014). Then, the *local governments* are interested in value-driven crowdshipping because of the positive societal impact on e.g. sense of community (Lin et al., 2020), environmental benefits (Rougès & Montreuil, 2014) and congestion (Rougès & Montreuil, 2014). They are not interested in profit-driven crowdshipping due to the expected negative societal impacts. Their power includes facilitating by creating trust, avoiding conflicts of interests, and ensuring processes are initiated smoothly (Binetti et al., 2019). Finally, other stakeholders are the Ministry of Economic Affairs and Climate Policy, the Ministry of Infrastructure and Water Management, environmental interest groups, academic researchers, and e-commerce companies. They are less powerful and less interested than the first four stakeholders.

The biggest problems between couriers and customers are trust and safety issues. The local government may play a role in guaranteeing credibility. Also, platform features (e.g. insurance or communication options) may increase this.

Second, the stakeholders' interests and power influence the way in which crowdshipping could be implemented as follows. The customers are the key stakeholder because they create demand and set the conditions for platform design and operation (Buldeo Rai et al., 2018). This influences the moving space of the couriers and platform. Customers must be attracted and the crowdshipping must be beneficial for them. Furthermore, couriers are important because they form the supply. Their main motivation is extra income in case of profit-driven crowdshipping (Cheng et al., 2022), although there are also negative effects for couriers. Therefore, adequate remuneration and attention to averting negative effects on couriers is important. Moreover, the platform is essential for bringing together supply and demand. The features of the platform determine whether couriers and customers like to use it. Thus, crowdshipping must provide sufficient profit to keep the platform interested. Next, the local governments play a role in facilitating the implementation of value-driven crowdshipping. They are mainly interested in the positive societal impacts. Therefore, crowdshipping implementation must be designed such that these positive impacts thrive.

It can be concluded that crowdshipping implementation should depart from which societal benefits aim to be achieved. This can be linked to the multi-issue approach by De Bruijn and Ten Heuvelhof (2018): more items than simply crowdshipping could be placed on the decision-making agenda. Couriers, customers, and local governments are highly interested in the societal benefits such as less CO_2 emissions (Buldeo Rai et al., 2017; Rougès & Montreuil, 2014), less congestion and nuisance (Buldeo Rai et al., 2017), and modal shift (Buldeo Rai et al., 2018; Paloheimo et al., 2016). This works well with value-driven crowdshipping. However, companies are mainly interested in economic benefits (Rougès & Montreuil, 2014). This works better with profit-driven crowdshipping. Still, the platform is essential in bringing together supply and demand. It also has a key role in platform design and operation. Therefore, it is important to design the decision-making process for crowdshipping implementation such that the positive societal impacts are maximised, while at the same time being economically interesting to a platform. To summarise, the position and interests of the courier are highly important, and value-driven crowdshipping is most promising. The next analysis elaborates on this by applying a participatory method to identify the attitude of potential courier target groups towards value-driven crowdshipping.

Analysis: Focus groups

The societal impacts diagram and stakeholder analysis showed that value-driven crowdshipping with travellers has most positive societal impacts and may receive most support. This was done with literature research. This Chapter aims to deepen the knowledge of value-driven crowdshipping with travellers by applying a participatory method rather than literature study. The goal of this Chapter is to determine the attitude of potential courier target groups towards value-driven crowdshipping. Three focus groups were conducted according to the methodology described in Chapter 2. This Chapter first discusses the design of all focus groups. Then, all focus groups are discussed separately. The Chapter ends with an interpretation of the results.

7.1. Design of all focus groups
All focus groups followed the script shown in Chapter D of the Appendix. There were four categories of questions: their opinion about urban last mile delivery in general; their opinion about crowdshipping in general; their opinion about participating as customer in crowdshipping; and their opinion about participating as courier in value-driven crowdshipping. Moreover, as part of this script, a video was shown to explain crowdshipping. This video can also be found in Chapter D of the Appendix. By following the exact same procedure and asking the exact same questions during all focus groups, standardisation was aimed for (Morgan, 1996). This makes it easier to compare results.

All focus groups were conducted in Dutch and lasted between 45-60 minutes. Participants indicated that the language was convenient for them. Also, the duration was sufficient to discuss the topic in-depth but still concisely. In all focus groups, the setting was rather natural and informal. Participants did not seem scared to express their opinion. All focus groups were rather homogeneous in terms of education level and social class. Guest et al. (2017) state that when focus groups are homogeneous, two or three groups are sufficient to mention at least 80% of all points.

7.2. First focus group
7.2.1. Group composition
The group consisted of 8 university students, of which 2 BSc. at a University of Applied Sciences, and 6 MSc. students at a University. They were selected because university students have been identified as a potential courier target group (Giuffrida et al., 2021; Marcucci et al., 2017; Triki, 2021). 5 of them were male, and 3 female. They were all between 16-24 years old. Young people are open to trying new things, to adopting required digital tools, and the sharing economy in general (Hwang & Griffiths, 2017). All of them indicated to use the bicycle as their main mode of transport. Three of them indicated that public transport is a close second. They all receive between 1 and 3 packages per month. Everyone lives in a relatively large city in the Netherlands with a population of at least 100 000.

It can be noted that this is a very homogeneous group due to their education level and social class. This stimulates dialogue (Kitzinger, 1994). The group dynamics felt rather natural and the setting was informal.

7.2.2. Urban last mile delivery in general
Participants indicated that they experience many negative societal impacts of urban last mile delivery. Delivery vans cause nuisance because they park in the middle of the road (Polle) and leave the engine

running (Folkert; Ilse), they drive recklessly (Ilse; Mark), and they drive (too) fast (Ilse; Leon; Saskia). Regarding the handover of packages, participants complained about careless handling (Leon) and that they do not like to receive packages for their neighbours (Folkert).

It appeared that the biggest negative societal impacts are more related to their personal lives and not the environmental aspects. However, when asked specifically, emissions (Ilse) and inefficient packaging (Saskia) are mentioned. Moreover, nuisance about drivers keeping the engines running (Folkert; Ilse) can be translated into negative environmental impacts.

Convenience was indicated as the main reason to order items online (Folkert; Ilse; Mies; Saskia). Participants prefer the fastest delivery method. Mies and Saskia prefer package points, and Polle prefers package vaults. All other participants prefer home delivery. This mainly has to do with inconvenient locations of package points or vaults (Folkert). They all acknowledge that e-commerce deliveries have grown in the past years. Reasons mentioned are covid (Mies); ordering multiple items to avoid delivery costs (Job); increase of returned packages (Leon); and ordering multiple sizes (Ilse; Leon).

7.2.3. Crowdshipping in general
Participants were very critical about the success of crowdshipping. Two positive points were mentioned. Mark mentioned that in the future, motorised vehicles may be banned from city centres. Folkert indicated that crowdshipping might work in a niche with younger people. However, all other points were rather critical. Job indicated that the required extra effort for couriers needs to be low. Mies indicated that income is an insufficient incentive, and Leon added that other (possibly non-monetary) benefits might be necessary to incentivise couriers. Furthermore, network density (Mies) and consolidation (Folkert) are mentioned as critical factors.

In general, they do not believe crowdshipping is beneficial for society. First, due to the likelihood of dedicated drivers (Polle) and "flash deliveries" (Leon). Also, it might lead to increased volume (Mark). One positive point was mentioned by Folkert, who stated that social cohesion may increase. However, Folkert, Leon, and Polle were very critical about the practical implementation of this. E.g., do couriers and customers really want to drink a cup of coffee together when delivering a package? Polle indicated that the personal contact with current delivery drivers (e.g. from PostNL) is not that friendly.

Regarding the environmental benefits, consolidation is mentioned as an important factor (Ilse). Detours and increased volume are the main reasons why crowdshipping may not have environmental benefits (Mark).

7.2.4. Participating as customer
Participants had many concerns regarding crowdshipping from the customer perspective. Their participation depended on the price (Folkert; Leon), value of their package (Ilse; Polle), and delivery times (Leon; Mies). Moreover, participants had privacy (Folkert; Mark; Saskia) and compliance concerns (Leon; Polle). Mark indicated that he would not want to share private data with the courier, e.g. pictures of the contents of his package. Folkert also raised one issue regarding the courier. He would like to know the rating of the courier beforehand. Leon added that he might not want a 2/5 star rated courier.

7.2.5. Participating as courier in value-driven crowdshipping
The answers to the questions about crowdshipping as a courier, mostly started with "it depends on...". Effort was an important factor (Job; Mark). This is related to the pick-up locations (Folkert), detours (Ilse), and how soon it needs to be delivered (Mies). The characteristics of the package were also important. Participants mentioned size (Ilse), weight (Mies), value (Ilse). Also, participation depended on the remuneration (Mark). Related to this, Polle's opinion depended on how the extra income is registered tax-wise. Moreover, liability issues are important (Leon).

Then, some interesting personal factors were mentioned. Job mentioned the dependency on how much time he has available during the day. Ilse, on the other hand, indicated that she would not always trust herself, e.g. to not forget about the package. Finally, Folkert pointed out that he would prefer to

bring packages on longer trips, for instance when he travels by train. He believes it will increase effectiveness.

On the positive side, participants indicated the remuneration (Folkert; Mark). Also, they think it might improve social cohesion (Folkert; Ilse; Polle). The non-monetary benefits were summarised by Leon as "karma points".

7.2.6. Voting results
Despite their many concerns about participating as couriers, a reasonable number voted yes. Regarding the size, 3 people voted yes, and 5 people voted no. Apparently, seeing a picture was more important than the size, as 5 people voted yes, and 3 people voted no. Saskia indicataed that a picture gives her a better idea of whether it would fit in her backpack. Mark raised privacy concerns about sharing a photo. When nothing is known, no one would participate.

7.3. Second focus group
7.3.1. Group composition
The group consisted of 8 people who work full-time. Full-time employed people are considered prone to adopting crowdshipping (Punel et al., 2018). 6 of them have a MSc. degree at a university, 1 has a BSc. degree at a University of Applied Sciences, and one has graduated from secondary vocational education (MBO). 2 people were male, 6 were female. 1 was between 16-24 years old, 4 between 25-34, and 3 between 55-64. 4 people considered the bicycle their main mode of transport, 2 people chose the car, 1 person a mix between bicycle and car, and the last person a mix between bicycle and train. 7 people receive between 1 and 4 packages per month, whereas 1 person indicated to receive 12. There were considerable differences in hometown population. The smallest hometown had a population of 3500, whereas the largest town had a population of 820000.

Again, this is a rather homogeneous group considering education level. Only one person is not higher educated. There was much discussion among participants and many participants had strong opinions about the topic.

7.3.2. Urban last mile delivery in general
Whereas the first group focused on negative impacts on their personal lives, the second group started with negative impacts on society. First, it encourages increased consumption (Karlijn). This increases individualism and people living isolated from others (Josi). This makes the cityscape less liveable and attractive because brick-and-mortar stores disappear (Lusi). In their personal lives, they experience a high workload for delivery drivers (Lars; Lusi; Yael). Karlijn and Yael indicated that hasty delivery drivers often deliver their packages at the neighbour's. This causes fights between them. However, others pointed out that they have good contact with the delivery driver and neighbours (Femke; Milou). Thus, it can both increase or decrease social cohesion.

Contrary to the first group, participants in the second group were highly concerned about the environment. They see that in the past five years, people have become more concerned about the negative impacts on the environment (Josi; Karlijn; Lars; Lusi; Yael). However, it is becoming more convenient to order online (Stephan) and to return items (Karlijn). Many items (e.g. clothes) are burnt after returning (Karlijn). This has a high impact on the environment. Covid has also added to the increase of e-commerce (Stephan). Other people might enjoy shopping online for fun (Josi), but participants from this focus group say that they only order products they know they will keep (Karlijn; Milou). Also, participants choose greener delivery options, e.g. package points or ordering with the same LSP (Milou; Stephan). However, this is not always an option (Stephan).

7.3.3. Crowdshipping in general
Participants raised critical points about the success of crowdshipping. First, trust (Yael) and liability issues (Karlijn) play an important role. Milou states it could only work with a courier review system. Karlijn and Lusi believe it could work, but only in a niche. Due to the small scale and low effectiveness, they believe crowdshipping is not beneficial for society. Other negative impacts mentioned were the possibility of dedicated drivers (Femke) and the lack of consolidation (Stephan). Milou pointed out one

positive aspect, namely reduction of emissions.

7.3.4. Participating as customer
Even though participants were highly critical about the benefits of crowdshipping, they would all participate as a customer. Karlijn and Milou even mention they see no reason not to participate. Josi and Lars would participate because of sustainability. Stephan would only participate if track-and-trace can be implemented.

7.3.5. Participating as courier in value-driven crowdshipping
Despite their low criticism about participating as customer, they had many concerns about participating as courier. Lusi and Stephan would not participate at all because it requires giving up free time. The other participants have the following concerns. First, they do not want to invest much effort (Milou) and time (Karlijn). This depends on the size (Josi), detour (Milou), the weather (Josi), and the time of the day (Lars; Yael). Also, it is convenient if the app would give a push notification of an available task (Milou). Second, the customer is important. Milou would only deliver if she can trust the customer. Lusi might change her mind if the customer is highly in need of help, e.g. an elderly person who desperately needs important medicines. Yael wants to make sure the package does not contain hazardous or illegal items. Third, the remuneration is not an incentive for them (Milou; Stephan). Finally, Yael would only do it on longer trips because of effectiveness.

Two benefits of crowdshipping as a courier were mentioned. Namely, exercise (Femke) and improved social cohesion (Femke; Milou). Then, three disadvantages were mentioned. First, the customer might not be home (Karlijn). Milou does not like the effort of constantly looking at the app for available tasks. Finally, it makes you inflexible because you have committed to a certain plan (Karlijn).

7.3.6. Voting results
Table E.1 shows the voting results. When the size is known, 6 people would participate, and 2 would not. Then, when a picture is seen, 2 people would participate as couriers, and 6 would not. However, after the second round of votes, Lusi explained why she would not participate. Namely, she does not like the extra effort besides her busy job. This convinced Milou and Stephan to change their votes from the first and second round. In general, people agreed that they simply do not see themselves as couriers (Josi; Lusi; Stephan).

7.4. Third focus group
7.4.1. Group composition
The group was assembled because the first focus group showed an unexpectedly negative attitude towards crowdshipping. This could be due to the group dynamics and people being influenced by strong opinions of others. Therefore, another focus group was organised with the same target group, namely university students.

The group consistent of 7 MSc. university students. 3 of them were male, and 4 female. One person was between 25-34 years old, whereas the others were all between 16-24. 5 students indicate the bicycle as their main mode of transport, one chooses a mix between bicycle and train, and the last person prefers to walk. They receive between 1 and 4 packages per month on average. They all live in the same large city in the Netherlands with 200 000 inhabitants. Again, this is a very homogeneous group regarding education level, age, preferred mode of transport, and social class.

7.4.2. Urban last mile delivery in general
Delivery vans are considered the biggest cause of negative societal impacts of urban last mile delivery. First, they cause congestion because they stop in the middle of the road (Iwan). Second, delivery drivers are always in a hurry so they do not pay much attention to other road users. This decreases road safety (Jonita). Third, Micha points out that especially in city centres the delivery vans cause nuisance because they impact liveability. Streets become less personal and less accessible (Micha). Fourth, Fenna adds that air pollution from delivery vans also impacts liveability. Regarding the impacts on their daily lives, Andel mentioned that the customer is bound to delivery times that cannot be chosen. Alternatively, she opts for package points. Finally, CO_2 emissions (Iwan; Nick) and air pollution

(Fenna) are mentioned as negative environmental impacts.

Micha mentions that it has become very easy and convenient for customers to order something instead of going to the store themselves. Covid has increased the volume of online orders (Fenna). When ordering online, participants think about the negative impacts a little bit. Fenna becomes more aware of the package's origin (e.g. China), but does not consider the last mile thoroughly. Documentaries help increase awareness, but it is difficult to translate awareness into actions (Jonita). Andel admits that there are options to reduce the CO_2 impact of online orders, but that she never chooses this. Convenience remains the most important consideration (Nick). Iwan points out that companies are also becoming more aware of the CO_2 impact of their deliveries.

7.4.3. Crowdshipping in general

In general, participants have a positive attitude towards crowdshipping. There are safety issues, but they are not that significant (Micha). Nick emphasises that it is important that these safety issues be overcome. More prerequisites are mentioned. First, centralisation of packages must be possible (Iwan). For instance, couriers transport packages from hub to hub (Andel; Fenna). Second, timely delivery must be guaranteed to customers (Nick). Third, a sufficient number of couriers is necessary (Andel). Finally, Fenna stresses that societal awareness of the benefits must increase for crowdshipping to work.

Participants point out several benefits of crowdshipping. First, it uses idle capacity more efficiently (Micha). Second, it improves social cohesion (Andel). However, the social protection and rights of dedicated couriers are a point of attention (Micha). Jonita and Nick believe crowdshipping will not be beneficial for society and the environment due to the possibility of dedicated couriers. Furthermore, the impact on the environment depends on detours (Andel) and the modality chosen by couriers (Micha; Nick).

7.4.4. Participating as customer

Only one participant immediately says yes to crowdshipping as a customer. Namely, Esther believes that couriers can be trusted. Other participants express their prerequisites. First, the delivery time window must be narrow (Fenna). Also, it must be certain that it will be delivered within the window (Esther). Second, courier reviews are important (Andel). Another option to validate courier trustworthiness is to check them as well. For instance, flash delivery service Flink implemented a system where the recipient has to tell the courier a code to confirm the package has been delivered (Fenna). Fenna would only send inexpensive packages, and Esther and Nick would like a warranty.

7.4.5. Participating as courier in value-driven crowdshipping

Two participants express a definite yes or no towards crowdshipping. Esther says no, because it requires extra effort. Andel says yes, when she has a full-time job and her daily trips become more predictable. Other people discuss which aspects are relevant in their decision to become courier. First, the pick-up and delivery locations must be easy to find (Fenna). Second, the delivery location must be trustworthy (Andel). Third, it is important that the package can certainly be delivered (Andel; Esther). Fourth, the magnitude of the remuneration is important (Iwan; Nick). Fifth, Micha would like to see some non-monetary appreciation as well. Sixth, it depends on the detour compared to the original trip (Fenna). Seventh, the size and weight are important (Andel) and must correspond to what has been communicated (Fenna). Eighth, the package must not contain animals or hazardous items (Iwan) and not be fragile (Jonita). Finally, Jonita summarises that she would participate if it is made as conveniently as possible.

Three main benefits for couriers were mentioned. First, the remuneration (Andel; Iwan; Nick). Second, contributing to a better world (Andel). Third, by participating, you increase trust in the system (Micha). However, the list of disadvantages is longer. In general, it will cost extra time (Andel; Fenna; Nick) and effort (Fenna; Micha). Besides the detour, paper work causes extra effort. This extra effort restricts your flexibility during the day (Andel; Iwan; Nick). Moreover, depending on the modality, the detour might cause extra fuel costs. Next, it is possible that the customer not be home (Nick). Finally, you are responsible for someone's package, which might cause liability issues (Esther).

7.4.6. Voting results
Table E.1 shows the voting results. 5 participants would participate as courier when they know the size, and 2 would not. The scores are the same in the situation that they have seen a picture. However, Andel values the picture over the size because it could be very heavy. Micha, on the other hand, prefers size over picture because a picture could be misleading. Nick would never participate because he does not want to invest the effort. No one would participate when they know nothing.

7.5. Interpretation of results
The goal of the focus groups was to deepen the knowledge of value-driven crowdshipping with travellers by applying a participatory method. First, all focus groups will be interpreted separately. Then, a combined interpretation is provided.

In the first focus group, participants had many doubts about participating in crowdshipping. Their doubts regarded the extra effort they need to put in. This depended on the package weight, size, and value. Moreover, liability issues were raised. Furthermore, they lacked environmental awareness and community spirit, which would be two important motivations to participate (Punel et al., 2018; Punel & Stathopoulos, 2017). In general, they were very critical about crowdshipping. They believe that the dedicated drivers, low efficiency, and increased volume cause negative impacts. However, this critical attitude might be attributed to the fact that one person clearly states their opinion, and other participants follow. This influence on group dynamics is a disadvantage of focus groups. Moreover, the SFF framework showed that it is very important to keep the couriers happy (Buldeo Rai et al., 2017). Wicaksono et al. (2021) argues that platforms might find it more challenging to attract couriers than customers. However, although their willingness to participate is low in general, participants of the first focus group were more willing to participate as couriers than as customers. Finally, participants from this group had many different study backgrounds, ranging from tax law, to human resource management or industrial design engineering. Therefore, a wide range of concerns was expressed. It is possible that the expertise from others reinforced the negative group attitude towards crowdshipping.

In the second focus group, participants had many concerns about crowdshipping. Despite their concerns, they would all participate as a customer if trust and liability and security issues were overcome. They had many more concerns about participating as courier due to trust and effectiveness issues. Moreover, they highly value their free time and do not want to invest effort into crowdshipping. The remuneration was not an incentive for them. This makes sense because they all have full-time jobs, which pay better than the crowdshipping task. Additionally, it was seen that participants in this group strongly voiced their opinions. During voting, two people changed their vote after hearing other people's thoughts. Also, regarding the environmental awareness, the people who ordered least often voiced the strongest opinions. It is possible that participants with less environmental spirit did not want to share their thoughts due to peer pressure. Only at the very end of the meeting, it appeared that people's opinions were highly influenced by others. Thus, despite the strong opinions, this focus group provided valuable insights.

In the third focus group, it was seen that participants had a rather positive attitude towards crowdshipping. This was seen in their voting results. They had some concerns, but were confident that these issues could be overcome. For instance, safety issues were not considered that big. Interestingly, participants proposed a hub-to-hub system where it is clear where goods need to be transported. Finally, participants had a very similar educational background, namely industrial engineering or econometrics. This explains why they mentioned less diverse concerns than the first focus group. Also, they all lived in the same city. Groningen is a very young city and city logistics are focused on biking and walking. These reasons may explain participants' positive attitude towards crowdshipping compared to the first group.

All focus groups had a mix between male and female participants. However, all groups were rather homogeneous in education level, namely highly educated. Miller et al. (2017) finds that people with a graduate degree were less motivated to participate. This matches with the findings from the second focus group. It could be attributed to the fact that they earn more money than the remuneration from crowdshipping. From all three focus groups, it can be concluded that university students are the most

promising target group. Namely, they value the remuneration higher than full-time employees, and they appreciate their free time differently than full-time employees. All focus groups showed that couriers want to invest as little effort as possible. This extra effort depends on the time investment, the package size, and weight. This matches with findings from Fessler et al. (2022) and Kourounioti et al. (2021).

The differences between all groups can be summarised as follows. The first group focused mainly on the failure factors and negative societal impacts of crowdshipping. They had more concerns about being a customer than a courier. The second group focused on themselves, and how they personally would gain or lose from crowdshipping. They had more concerns about being a courier than a customer. Environmental awareness was mentioned most elaborately in this focus group. The third group mentioned a mix between positive and negative societal impacts, and success and failure factors. They had a more positive attitude towards crowdshipping, and believed that certain barriers could be overcome. Their concerns about being a customer or courier were comparable.

From the results of the focus groups, the main conclusion is as follows: the general attitude of people from potential target groups towards participation in crowdshipping is negative. Negative aspects mentioned were unwillingness to invest time and effort, decrease of flexibility, low effectiveness, and liability and security issues. The negative attitude could be considered a potential important failure factor. It might also impact other SFFs. For this reason, the next analysis will provide an overview of all SFFs of crowdshipping and how they interact.

Analysis: SFF framework

The goal of this Chapter is to show the success and failure factors of crowdshipping in a framework. It identifies these factors and how they interact based on literature and stakeholder interviews. Additionally, it shows how the success of crowdshipping can develop over time.

This Chapter is structured as follows. First, the constructed framework and the way it should be read are presented. Similar to the societal impacts framework, the design of the SFF framework is the same for value-driven and profit-driven crowdshipping, but the application is different. The main SFF framework is shown in Figure 8.1. Then, the input for the framework is discussed. Namely, Section 8.2 explains which SFFs were found from literature. Section 8.3 explains which SFFs were taken from interviews and focus groups. Section 8.4 explains which SFFs were taken from Feitelson and Salomon (2004) and Geels (2002). Section 8.5 states which SFFs were taken from other frameworks. Finally, Section 8.6 applies the constructed framework to the case of crowdshipping. In this Section, distinction is made between value-driven or profit-driven crowdshipping. The SFF framework for value-driven crowdshipping is shown in Figure 8.2 and the SFF framework for profit-driven crowdshipping is shown in Figure 8.3. The analysis is synthesised with an overview of all SFFs for value-driven or profit-driven crowdshipping in Table 8.1. Next, the previous analyses and their influence on the identified SFFs is shown. The Chapter ends with an interpretation of the results.

8.1. SFF framework presentation

The framework is presented in Figure 8.1. It is based on Geels (2002)'s dynamic multi-level perspective on technological transitions (in yellow) and Feitelson and Salomon (2004)'s political economy model of transport innovations (factors in white; actors in white with dotted line; and feasibilities in grey). Additionally, other frameworks were added: Venkatesh et al. (2003)'s Unified Theory of Acceptance and Use of Technology model in purple, Emerson et al. (2012)'s integrative framework for collaborative governance (in orange), Andersen and Markard (2020)'s map of multi-technology interaction and associated sectors (in teal), Frambach and Schillewaert (2002)'s conceptual framework of organisational innovation adoption (in pink), and Belassi and Tukel (1996)'s schematic representation of success and failure factors (in red). Moreover, factors from stakeholder interviews are added (in blue). Finally, factors from literature (in green) were added to tailor the framework to crowdshipping. The two-coloured boxes (e.g. *market*), are based on two sources (namely literature and Geels (2002)). Then, regarding the arrows, the thick arrows show the development of time. These thick arrows are close to the *landscape developments* on top of the figure, the bundle of arrows between the *technological niche* and *social feasibility*, and the time axis on the bottom of the figure. Then, the thin arrows represent the influence of one SFF on another. This is for instance shown between *social network* and *scale*. Next, the dashed arrow with two heads show the interaction between the *landscape developments* and the SFFs, for instance *perceived effectiveness*. Finally, the grey box shows the legend.

The framework should be read as follows. Basically, there are three steps in time (on x-axis) that must be fulfilled before an innovation can be adopted. First, on the left bottom, the step *technological niche* from Geels (2002) is shown. Here, *technical feasibility* is important, which is influenced by a number of factors. One of these factors is *economic feasibility*. Over time, it can be seen that the technology will break from its niche. It is shown by a bundle of arrows because there are uncertainties and possibly tensions, that lead to incremental improvement of the innovation. Now, in the second step,
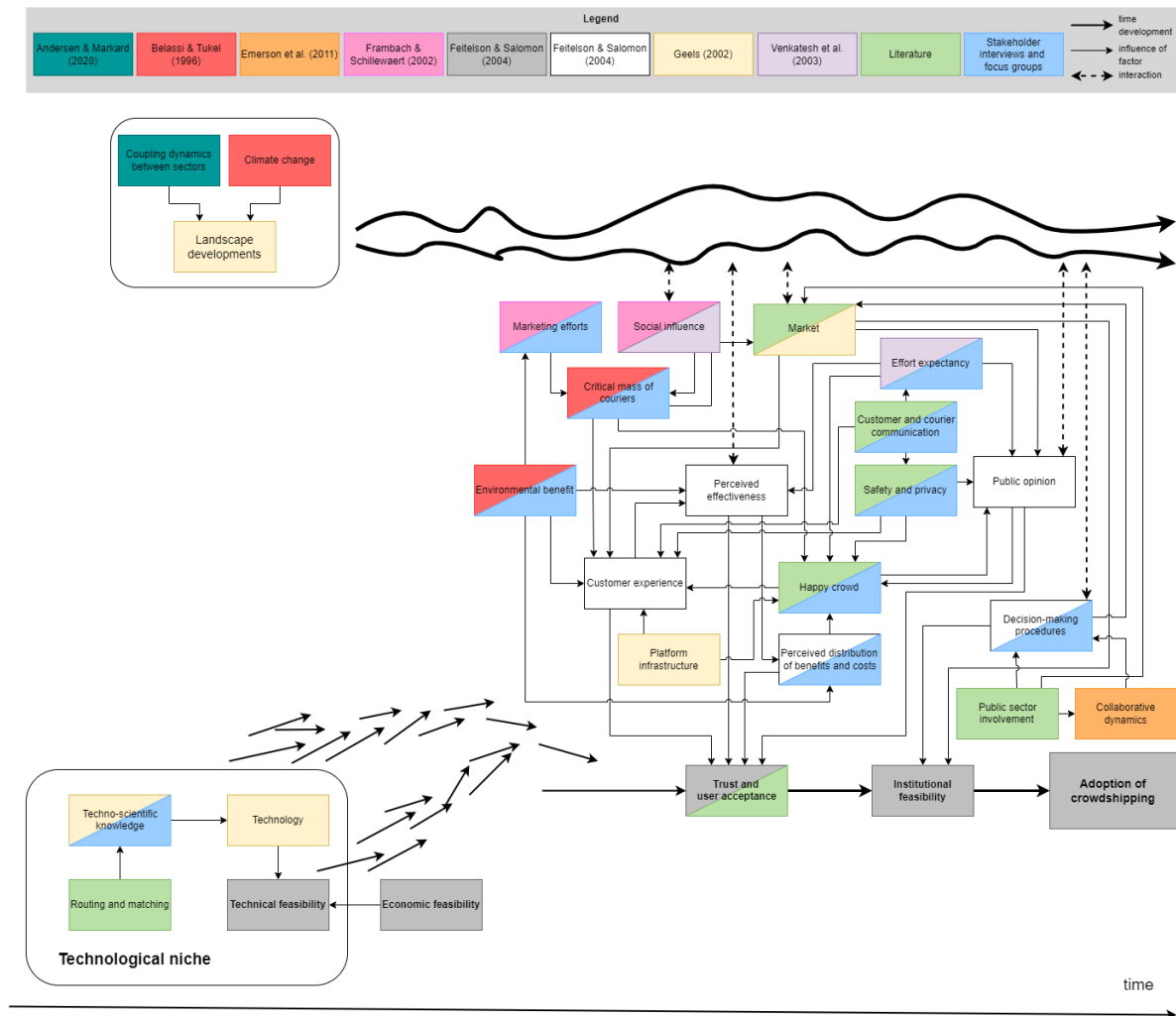
Figure 8.1: SFF framework constructed specifically for crowdshipping

trust and user acceptance become important. *Trust and user acceptance* are influenced by a number of factors shown on top. Additionally, the *landscape developments* on the top of the figure have an influence on a number of factors, shown by the dotted arrows. In return, these factors influence the *landscape developments* as well. Once the *social feasibility* has been proven, the third and final step regards *policy feasibility*. This is again influenced by factors above and the *landscape developments*. Once these three steps have been completed, this leads to *adoption of the innovation*.

8.2. SFFs from literature

The most important SFFs identified in literature are the following: user acceptance; trust; safety; privacy; contact between customer and courier; happy crowd; routing and matching; market factors; public sector involvement. These nine factors will now be explained separately.

First, *trust and user acceptance* regards the extent to which users trust the innovation and are willing to use it. The dependence on non-professional couriers emphasises the importance of trust. It is one of the most important factors in crowdshipping (Le et al., 2019). Both the customer and the courier need to trust the crowdshipping service. The customer wants their package to be delivered undamaged and on time (Le et al., 2019). They may have trust issues due to the reliance on occasional drivers (Punel et al., 2018; Rougès & Montreuil, 2014). The fact that it is a relatively new delivery method may make customers more critical about it (KPMG, 2014). The courier, on the other hand, also need to trust customer to not ship hazardous or illegal products (Le et al., 2019; McKinnon, 2016; Rougès &

Montreuil, 2014). Trust affects the *perceived effectiveness* and the target group of innovations (Thurner et al., 2022). Then, according to Otway and Von Winterfeldt (1982, p. 251), user acceptance depends on "the information people have been exposed to, what information they have chosen to believe, the values they hold, the social experiences to which they have had access, the dynamics of stakeholder groups, the vagaries of the political process, and the historical moment in which it is all happening". Due to the lack of available data, there is little research into user acceptance of crowdshipping services (Punel & Stathopoulos, 2017). However, it is identified as an important factor influencing the success of crowdshipping. Namely, understanding user acceptance is important to better understand the system, to improve operations, to design adequate policies for user's needs (Hasselwander et al., 2021; Punel et al., 2018).

Second, *safety* is closely related to trust (Marcucci et al., 2017). The risk that a package is stolen, damaged, or lost, is higher in crowdshipping than with traditional LSPs (McKinnon, 2016). Additionally, the courier runs the risk of unknowingly carrying a hazardous or illegal package (Le et al., 2019; McKinnon, 2016; Rougès & Montreuil, 2014). Moreover, the safety of couriers regards the exposure to exploitation (McKinnon, 2016).

Third, *privacy* is linked to safety and trust and is caused by the reliance on casual couriers (Cheng et al., 2022; Le et al., 2019; Punel et al., 2018). Customers may be worried about sharing their personal information with the courier, such as home address and purchasing habits (Fatnassi et al., 2015). Couriers, on the other hand, highly value their privacy and their unwillingness to be traced (Marcucci et al., 2017).

Although they are fundamentally different, *trust, safety* and *privacy*, fulfil a similar role in influencing *happy crowd, public opinion* and *customer experience*. Therefore, in the framework, they have been added together.

Fourth, there needs to be a sufficient number of couriers to increase efficiency and network effects (Triki, 2021). A sufficient number of couriers can be acquired by keeping them happy. This is done through minimisation of efforts from couriers (Cheng et al., 2022) or higher rewards (Lin et al., 2020). Buldeo Rai et al. (2017) considers a *happy crowd* as a top three factor that influences the success of crowdshipping.

Fifth, *contact between customers and couriers* is identified as an important factor influencing the willingness of people to participate in crowdshipping, either as courier or as customer (Marcucci et al., 2017). Direct contact positively influences trust (Rougès & Montreuil, 2014).

Sixth, *routing and matching* affects the efficiency and (environmental) benefits of crowdshipping (Giuffrida et al., 2021). This is necessary to make crowdshipping attractive for customers. It also depends on the availability of couriers, and their willingness to deliver a package (Le et al., 2019). Furthermore, efficient routing and matching enhances the attractiveness of crowdshipping to couriers, as it minimises their efforts (Cheng et al., 2022; Wicaksono et al., 2021). This is necessary to make crowdshipping attractive for couriers.

Seventh, *market factors* are identified by Van der Panne et al. (2003). They argue that the concentration of target market, timing of market introduction, competitive pressure, and marketing affect the success or failure of an innovation. It is applicable to crowdshipping because crowdshipping platforms have to compete with currently existing LSPs (Frenken & Schor, 2019). Additionally, increased market competition may lead to better routing and matching (Le et al., 2019).

Eighth, Paloheimo et al. (2016) identified *public sector involvement* as a necessary factor for crowdshipping to break out of the niche and become more widely adopted. Van Wee et al. (2004) agree that involvement of local governments can be crucial in the success of transport innovations.

8.3. SFFs from interviews and focus groups

According to the Methodology in Chapter 2, three interviews were conducted. The interviewees were found through contact with Rodrigo Tapia, Postdoctoral Researcher at TU Delft. Together with the other interviewees, they work on the LEAD project. This is explained in more detail in Chapter 2.

The first interview was conducted with Thomas Robers from Next2Company. Next2Company is a consultancy firm, advising other companies on strategy and concept development. Thomas' role is project manager. His connection with crowdshipping is that he helps develop the strategy for the LEAD project in The Hague. Thomas mentioned that the right target group is very important. In their pilot, they are considering two groups: dedicated couriers and university students with special focus on commuters using public transport [1]. In the framework, this is included under *critical mass of couriers*. Additionally, he mentioned that it is important to gain knowledge. This is included under *techno-scientific knowledge*. More specifically, knowledge is necessary about the amount of courier remuneration. This is included under *happy crowd*. This is connected to a larger SFF, namely the financial aspect. The *perceived benefits and costs* of the parties involved should be considered. This influences the willingness-to-pay, included in *trust and user acceptance*.

The second interview was conducted with Jackson Amankwah from Nimber. Nimber is a Norwegian crowdshipping start-up. It was founded in 2010 and they currently have approximately 12 employees. Jackson is involved in many aspects of the start-up. Jackson contributed the success of Nimber in Norway to the *trust* that people have in the system. Generally, Norwegian people strongly believe in online businesses. The insurance that Nimber provides enhances this trust. Next, the *customer and courier communication* increases trust. People discuss the delivery time window and pick-up location. Additionally, pictures of the package help set expectations and makes communication easier. Jackson stresses that communication improves flexibility and trust. Moreover, Nimber recruits couriers through social media. *Marketing* is very important because people have to know about it. One of their their target groups is university students [2].

The third interview was conducted with Sven Mittertreiner from the Municipality of The Hague. Sven's role is strategic policy advisor, department Mobility, part of Service Urban Development. He focuses on Innovation and Experiments. His connection with crowdshipping is that he represents the municipality in the LEAD project. He has the roles of spokesperson and facilitator, connecting people using the network of the municipality. Additionally, he aims to set up pilots within the municipality. According to Sven, for crowdshipping to become successful, it is important to bring the right people together. More importantly, these people should be willing to invest time and effort in crowdshipping. This is incorporated in the framework under *decision-making procedures*. Additionally, he stresses the importance of doing pilots [3]. This is included in the framework under *techno-scientific knowledge*.

Finally, the focus groups described in Chapter 7 showed that participants are not very willing to participate because it requires them to invest time and effort. Moreover, they have liability and security issues. These aspects are included under *trust and user acceptance*.

8.4. SFFs from Geels (2002) and Feitelson and Salomon (2004)

First, Geels (2002) describes a multi-level perspective on technological transitions. It is shown in Figure B.4. Several changes have been made to fit the case of crowdshipping. First, Geels (2002) discuss *landscape developments*. Literature found that people's environmental awareness about climate change is a high motivation for crowdshipping activities (Marcucci et al., 2017; McKinnon, 2016). Over the years, this has become increasingly important to people (Thurner et al., 2022). For this reason, *landscape developments* were added. These affect the *public opinion* and *decision-making procedures*. By adding this, the *perceptions of problems (crises)* from Feitelson and Salomon (2004) were discarded.

Second, according to Geels (2002), *markets and user practices* belong together. However, for

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[1] Robers, T. (2022, April). Personal communication [Personal interview].
[2] Amankwah, J. (2022, April). Personal communication [Personal interview].
[3] Mittertreiner, S. (2022, April). Personal communication [Personal interview].

crowdshipping, it is better to separate them because of the high importance of the customer's willingness to participate. Additionally, "user" may be ambiguous because this covers both the courier and the customer, although there are large differences between them. Thus, together with *experience* from Feitelson and Salomon (2004), *user practices* has split up into *customer experience* and *happy crowd*. *Markets* was also found in literature, and has become a separate factor.

Third, *infrastructure* from Geels (2002) has become *platform infrastructure* because these are the only infrastructural changes required.

Next, the framework by Feitelson and Salomon (2004) was considered and adapted. The framework is shown in Figure B.3. The adaptations are as follows. First, *political feasibility* was changed to *institutional feasibility*. Now, it covers both the legal and the policy aspects that are still missing in the Netherlands (European Commission, 2021; Frenken & Schor, 2019).

Second, literature showed that trust, user acceptance, and the willingness to participate are very important for crowdshipping to develop (Buldeo Rai et al., 2017; Hasselwander et al., 2021; Punel et al., 2018). Because of this central role, *social feasibility* has been changed to *trust and user acceptance*. Here, user acceptance covers willingness to participate.

Third, the *sanctioned discourse* has been changed to *public opinion* to form a direct link with the *landscape developments* from Geels (2002). This link mainly regards the climate (Marcucci et al., 2017; McKinnon, 2016; Thurner et al., 2022). Additionally, literature shows that the public is mainly interested in substitution-based climate solutions (Schmid & Guinaudeau, 2022). This matches better with *public opinion* as links with *institutional feasibility* can be made more easily.

Fourth, *non-business interest groups* have been removed due to their small impact.

Fifth, *industry interests* have been removed because this is already covered by *market*.

8.5. SFFs from other frameworks

Besides Geels (2002) and Feitelson and Salomon (2004), five other frameworks have been considered and adapted. These frameworks are by Venkatesh et al. (2003), Emerson et al. (2012), Andersen and Markard (2020), Frambach and Schillewaert (2002), Belassi and Tukel (1996). Now, they will be explained in the mentioned order.

First, Venkatesh et al. (2003) describe their Unified Theory of Acceptance and Use of Technology model. It describes the seven constructs that appear to be significant direct determinants of usage. It is shown in Figure B.5. Venkatesh et al. (2003, p. 450) describe *effort expectancy*. It is defined as "the degree of ease associated with the use of the system" (Venkatesh et al., 2003). It is relevant because couriers and customers want to participate as easily and effortlessly as possible (Lin et al., 2020; McKinnon, 2016). Additionally, Venkatesh et al. (2003, p. 451) describe *social influence*. It is defined as "the degree to which an individual perceives that important others believe he or she should use the new system". It is relevant in crowdshipping because these social influences may have network and scale effects, leading to greater effectiveness. Additionally, it can be linked to the *landscape developments* of climate change.

Second, Emerson et al. (2012) describe their integrative framework for collaborative governance. It is shown in Figure B.6. *Collaborative governance* is relevant for crowdshipping because of the required public-private partnership. Emerson et al. (2012) describe two components of collaborative governance, namely shared motivation and capacity for joint action. These components stress another added advantage for crowdshipping, namely the potential of coupling values. Additionally, capacity for joint action can be nested under *institutional feasibility*, as the results of the joint action result in improvement of the institutional feasibility. Finally, the term collaborative *dynamics* is applicable because evolution of crowdshipping requires a dynamic and iterative process. As crowdshipping itself is not yet extensively researched, little is known about its governance aspects.

Third, Andersen and Markard (2020) describe a map of multi-technology interaction and associated actors. It is shown in Figure B.7. They argue that technology interactions can take place between sectors. Transitions involve major changes in a broad range of different, but at the same time interdependent technologies and sectors whose interactions determine its socio-technical character. Here, situation coordination and alignment between the involved sectors is crucial for the performance of the focal sector. These cross-sector technology interactions are important when an innovation evolves from its niche, and integration across sectors becomes important. Therefore, *coupling dynamics between sectors* are included that affect the landscape developments.

Fourth, Frambach and Schillewaert (2002) describe a conceptual framework of organisational innovation adoption. It is shown in Figure B.8. They argue that *marketing efforts* highly affect the perceived innovation characteristics of the innovation, and thereby the customer's decision to adopt. Here, three factors are most important: the targeting of the innovation, its communication, and the activities the supplier performs to lower the perceived risk (Easingwood & Beard, 1989). Marketing is important in crowdshipping because couriers are typically recruited online (Adams-Prassl & Risak, 2016). In the research by Strulak-Wójcikiewicz and Wagner (2021), the internet plays a decision in 32% of the decisions to become a courier. Next, an important factor according to Frambach and Schillewaert (2002) is the social network. Informal information sharing leads to more incentive for customers and couriers to join crowdshipping. This links to *social influence* from Venkatesh et al. (2003) and it positively affects *scale* from Belassi and Tukel (1996).

Fifth, Belassi and Tukel (1996) describe their schematic representation of success and failure factors. It is shown in Figure B.9. First, they state that size and value are important factors. For crowdshipping, it has been renamed to *critical mass* because it refers to the critical mass of couriers that is necessary for its success (Parker & Van Alstyne, 2005; Triki, 2021). Next, Belassi and Tukel (1996) describe environmental effects. Environmental spirit is an important motivation for people to participate in crowdshipping (McKinnon, 2016; Punel et al., 2018). Moreover, due to marketing efforts, climate change is increasingly receiving attention (Rougès & Montreuil, 2014).

8.6. Application of framework to crowdshipping

The previous sections explained which factors were relevant to include in the SFF framework, tailored for crowdshipping. Now, this section explains per step how the framework can be applied to the case. It will only discuss the most important applications. A complete overview of factors in alphabetical order, description, source(s), and application to value-driven crowdshipping and profit-driven crowdshipping can be found in Table 8.1 at the end of this Chapter. The SFF framework for value-driven crowdshipping is shown in Figure 8.2 and the SFF framework for profit-driven crowdshipping is shown in Figure 8.3.

8.6.1. Technological niche factors

The frameworks starts on the bottom left, with the technological niche. There is no difference between value-driven or profit-driven crowdshipping. It can be argued that the technical aspect of crowdshipping is important but not very complicated. Many articles have focused on routing algorithms (e.g. Cheng et al. (2022), Ghaderi et al. (2022), and Triki (2021) or technological infrastructure (e.g. Hasselwander et al. (2021) and Wang et al. (2016)) . Le et al. (2019) conclude that current literature provides various matching algorithms. Although more research will lead into optimisation of routing and matching and useful features for platforms, it can be concluded that the technological knowledge is currently sufficient to break out of the niche. Moreover, the economic feasibility is an important factor for profit-driven crowdshipping. Customers will consider crowdshipping because it is cheaper than shipping with traditional LSPs (Le & Ukkusuri, 2019; Rougès & Montreuil, 2014). Chapter 4 showed that various pricing models are possible. Therefore, it can be assumed that a pricing model can be found to ensure that crowdshipping is economically feasible. In value-driven crowdshipping, the remuneration is low so economic feasibility is not very relevant.

8.6.2. Trust and user acceptance factors

Next, the factors influencing *trust and user acceptance* are relevant. First, *marketing efforts* and *social influence* affect *critical mass of couriers*. Typically, customers and couriers are recruited through the internet (Prassl & Risak, 2015). *Social influence* often relates to the sustainability argument (Paloheimo
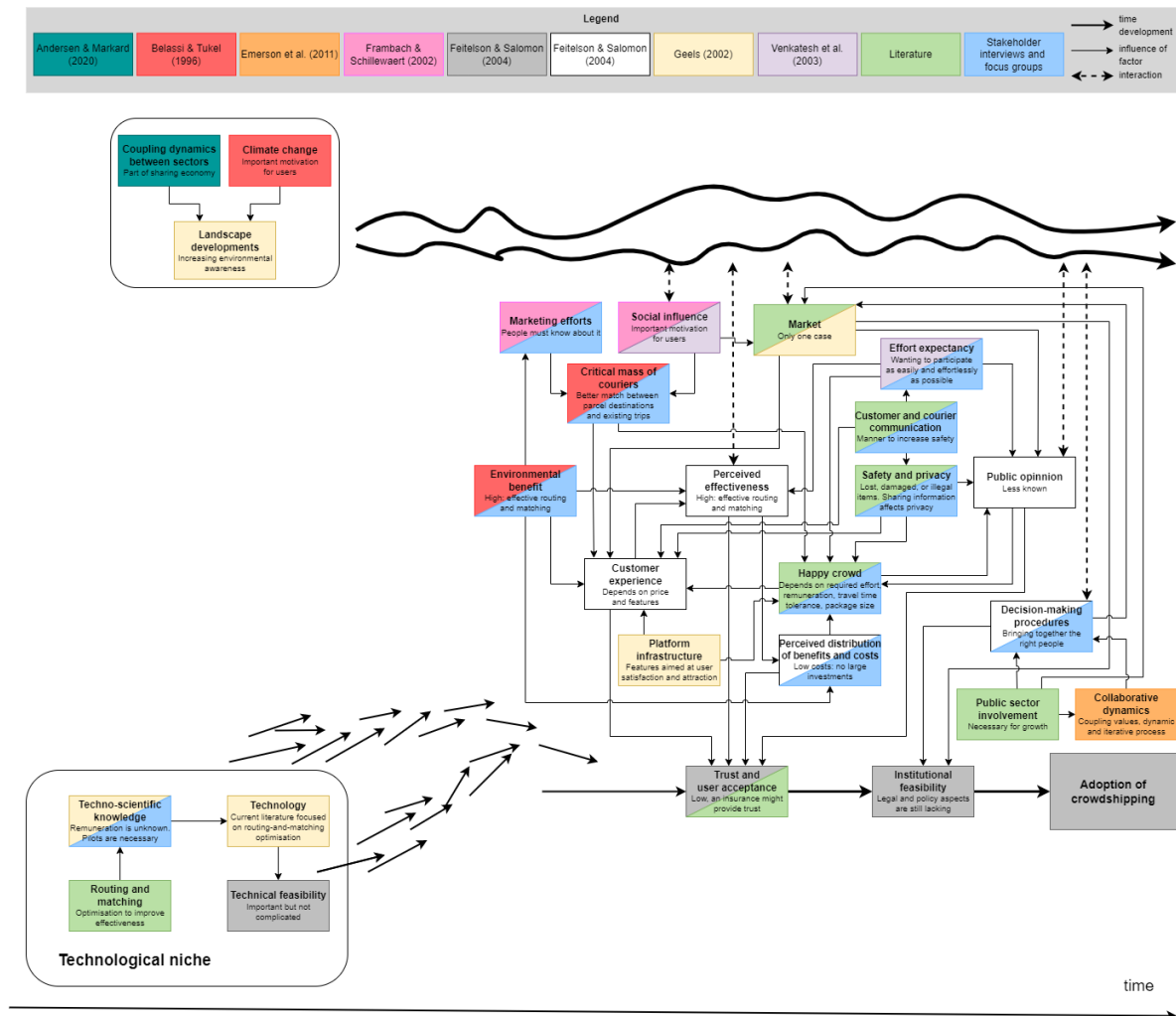
Figure 8.2: SFF framework constructed specifically for value-driven crowdshipping

et al., 2016). A critical mass of couriers is required for fast, flexible and cheap delivery. A large courier base helps attract customers. However, a critical mass of customers is required to attract couriers (Rougès & Montreuil, 2014). This is recognised as the chicken-and-egg problem (Frehe et al., 2017; Rougès & Montreuil, 2014).

Then, the *landscape developments* influence the *trust and user acceptance* and *institutional feasibility*. The landscape developments mainly regard *climate change* (European Commission, 2021; Thurner et al., 2022) in case of value-driven crowdshipping. Specifically, crowdshipping heavily relies on people's environmental spirit and their willingness to resolve sustainability problems (Marcucci et al., 2017). Additionally, the growth of e-commerce is a reason for the development of crowdshipping (Kourounioti et al., 2021; Rougès & Montreuil, 2014). An important influence is given by *coupling dynamics between sectors*. The sharing economy is an umbrella construct that has been receiving much enthusiasm (Frenken & Schor, 2019) . Examples in other sectors are ride-sharing (Uber) or sharing of homestays (AirBnb). Sharing economy has become widespread and can be applied to the delivery market as well.

Literature agrees about the *environmental benefit* of crowdshipping. The environmental benefits include decrease of pollution, noise, congestion (Rougès & Montreuil, 2014). The *perceived effectiveness* is high because of the possibilities for effective and efficient routing and matching (Ghaderi et al., 2022). However, there is a large difference between the benefits of value-driven or profit-driven crowdshipping. This was seen in the societal impacts in Chapter 5. Next, crowdshipping only re-
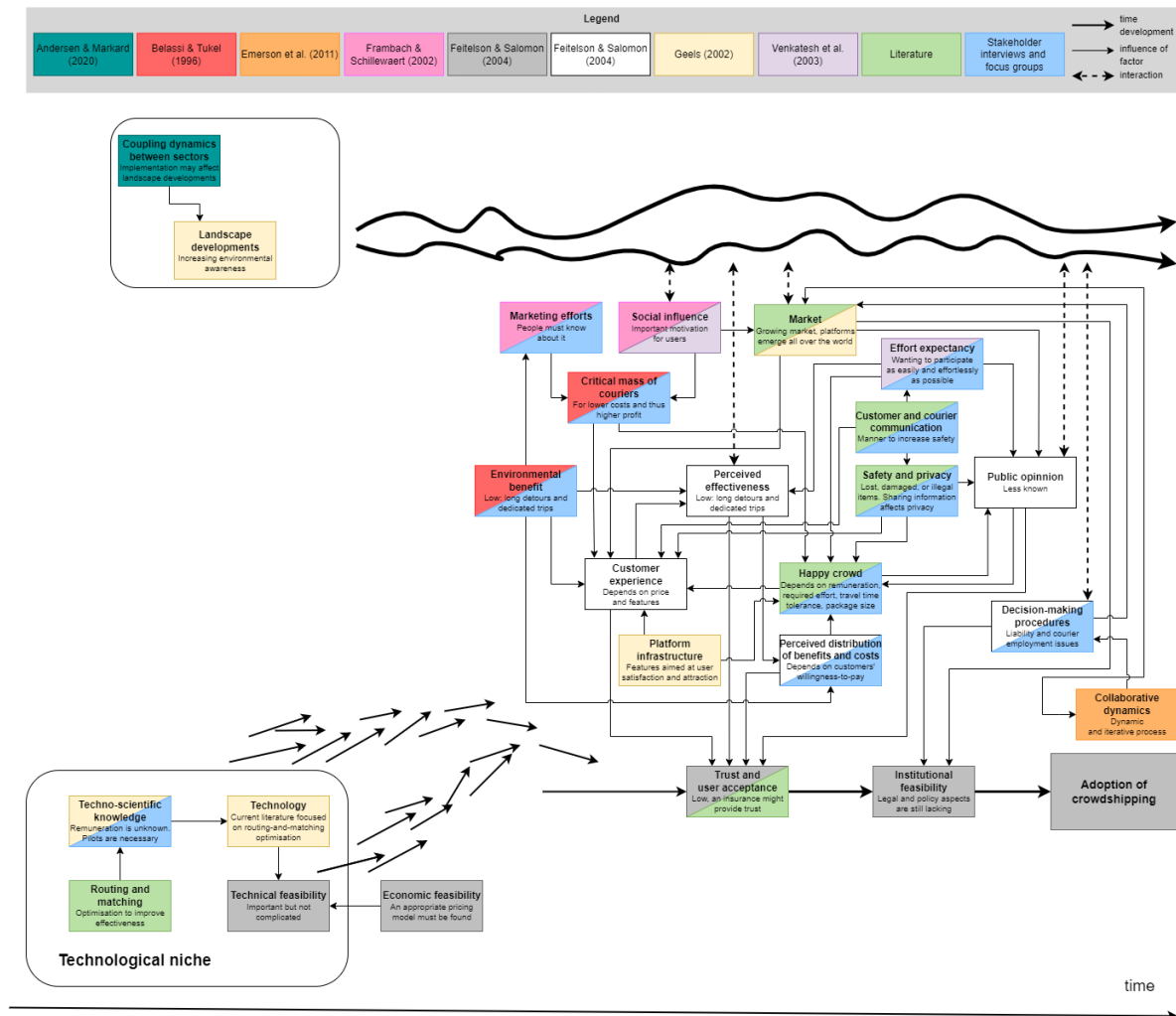
Figure 8.3: SFF framework constructed specifically for profit-driven crowdshipping

quires an asset-light infrastructure, with no large investments or maintenance costs (Mladenow et al., 2016). Next, customers prefer to pay individuals rather than companies (Strulak-Wójcikiewicz & Wagner, 2021). This positively influences the *perceived distribution of benefits and costs*. Moreover, in general, the service is cheaper than with traditional LSPs (Binetti et al., 2019; Rougès & Montreuil, 2014). Value-driven crowdshipping does not considerably depend on the remuneration and price paid. Profit-driven crowdshipping, on the other hand, departs from the costs. However, the crowdshipping price will not exceed the traditional LSP prices because they will most likely co-exist.

The *market* of crowdshipping is growing, with platforms emerging all over the world (Punel & Stathopoulos, 2017). Rougès and Montreuil (2014) contribute this growth to the development of e-commerce. The *platform infrastructure* can be composed of various features, with goal of ensuring user satisfaction, delivery safety, and security. Additional features make the platform more attractive to customers and couriers (Le et al., 2019). Buldeo Rai et al. (2018) found "Good platform operation" to be recognised as a top-three factor influencing the willingness-to-work of couriers.

Next, the *contact between customer and courier* is an important manner to increase safety (Rougès and Montreuil (2014) and the interview with Nimber, see Section C.3). This is implemented by various companies. Additionally, many companies enact rigorous selection processes, secure online payment systems and feedback systems to ensure safety and privacy (Rougès & Montreuil, 2014). However, this leads to increased *effort expectancy*, decreasing courier's motivation in both value-driven and profit-driven crowdshipping.

Moreover, the *public opinion* on crowdshipping is less known. Various articles describe that the willingness to participate is high (e.g. Kourounioti et al. (2021), Lin et al. (2020), and Thurner et al. (2022). However, before conclusions can be drawn about the public opinion, crowdshipping should be implemented on a larger scale.

Finally, *happy crowd* can be considered a success or failure factor depending on the remuneration, package size, and travel time tolerance (Kourounioti et al., 2021). These factors influence the detour distance they are willing to take (Ghaderi et al., 2022). Other important factors are improving task assignment, routing efficiency, and courier productivity (Wicaksono et al., 2021). For value-driven crowdshipping, it is important to minimise the courier's efforts. For profit-driven crowdshipping, high rewards are important. Next, the *customer experience* depends on the price and the features of the platform (Rougès & Montreuil, 2014). Between the two, *happy crowd* is most important, as crowdshipping platforms may find it more challenging to attract couriers than customers (Wicaksono et al., 2021).

8.6.3. Institutional feasibility factors

It is clear that crowdshipping requires collaboration between various stakeholders (Lin et al., 2020). In profit-driven crowdshipping, the collaborating stakeholders are the couriers, customers, and platform. In value-driven crowdshipping, local governments may collaborate to increase trust (Van Wee et al., 2004). No articles about *public sector involvement* or *collaborative dynamics* in crowdshipping have been found. Also, even the interview with the Municipality of The Hague (see Section C.4) did not provide more clarity, as the municipality has multiple objectives and is divided over various departments. However, there are examples of successful governmental involvement in crowdshipping (e.g. Paloheimo et al. (2016)).

Then, the *decision-making procedures* are important. In the "European agenda for the collaborative economy", the European commission provides legal guidance and policy orientation for development of the sharing economy. This is because of the varying regulatory and tax policies across EU member states (European Commission, 2021). The legal framework should answer liability questions and the employment status of couriers (KPMG, 2014; Mladenow et al., 2016). This is mainly important in profit-driven crowdshipping.

Factor	Description	Source(s)	Application value-driven CS	Application profit-driven CS
Climate change	Long-term shifts in temperatures and weather patterns due to human activities.	Belassi & Tukel (1996)	Important motivation for couriers and drivers to participate in crowdshipping.	Not applicable due to the negative impact on sustainability.
Collaborative dynamics	Dynamics between stakeholders who collaborate towards a shared goal, consisting of three interactive components: principled engagement, shared motivation, and capacity for joint action.	Emerson et al. (2011)	The potential of coupling values may have promising results. The evolution of CS requires a dynamic and iterative process. The public sector may be involved (Emerson et al., 2011).	The evolution of CS requires a dynamic and iterative process (Emerson et al., 2011).
Coupling dynamics between sectors	Technology interactions can take place between sectors.	Andersen & Markard (2020)	Implementation of CS may affect the landscape developments. CS is part of the sharing economy, which has been receiving much enthusiasm (Frenken & Schor, 2019).	Implementation of CS may affect the landscape developments.
Critical mass of couriers	A significant number of couriers is necessary to increase efficiency and network effects.	Belassi & Tukel (1996) and interview with Thomas Robers	A critical mass allows better match between parcel destinations and existing trips.	A critical mass allows for lower costs and thus higher profit.
Customer and courier communication	People discuss the delivery time window and the pick-up location.	Marcucci et al. (2017) and interview with Jackson Amankwah	It is a manner to increase safety (Rougès & Montreuil, 2014).	
Customer experience	The customer's holistic experience with crowdshipping.	Feitelson & Salomon (2004)	Depends on the price and features of the platform.	
Decision-making procedures	The process of making choices by identifying a decision, gathering information, and assessing alternative resolutions.	Feitelson & Salomon (2004) and interview with Sven Mittertreiner	The right people should be brought together, who are willing to invest time and effort (Mittertreiner, 2022, personal communication, 28th of April).	Legal guidance and policy orientation are lacking regarding liability and the employment status of couriers (European Commission, 2021).
Economic feasibility	Whether the innovation can pass a cost-benefit analysis.	Feitelson & Salomon (2004)	Small remuneration so not very relevant.	An appropriate pricing model must be found.
Effort expectancy	The degree of ease associated with the use of the system.	Venkatesh et al. (2003) and focus groups	Couriers and customers want to participate as easily and effortlessly as possible (Lin et al., 2020; McKinnon, 2016).	
Environmental awareness	Understanding the fragility of our environment and the importance of its protection.	Belassi & Tukel (1996)	Environmental awareness is a high motivation for CS activities (Marcucci et al., 2017; McKinnon, 2016).	Not much considered.
Environmental benefit	Reduction of environmental impacts.	Belassi & Tukel (1996) and focus groups	High because of the possibilities for effective and efficient routing and matching (Ghaderi et al., 2022).	Low due to long detours and dedicated trips (Buldeo Rai et al., 2018; Ghaderi et al., 2022).
Happy crowd	Satisfied couriers.	Buldeo Rai et al. (2017), Triki (2021) and interview with Thomas Robers	Depends on the remuneration, package size, and travel time tolerance (Kourounioti et al., 2021). It is important to minimise efforts from couriers (Lin et al., 2020).	Depends on the remuneration, package size, and travel time tolerance (Kourounioti et al., 2021). It is important to provide higher rewards for couriers (Lin et al., 2020).
Institutional feasibility	Legal and policy aspects that are important to consider.	Feitelson & Salomon (2004)	The legal and policy aspects are still missing in The Netherlands (European Commission, 2021; Frenken & Schor, 2019).	
Landscape developments	A deep set of structural trends.	Geels (2002)	Environmental awareness is increasingly important to people (Rougès & Montreuil, 2014).	The sharing economy is seen as an emerging market (Frenken & Schor, 2019).

Factor	Description	Source(s)	Application value-driven CS	Application profit-driven CS
Market	The concentration of target market, timing of market introduction, competitive pressure, and marketing affect the success or failure of an innovation.	Van der Panne et al. (2003) and Geels (2002)	Only one case (Paloheimo et al., 2016).	Growing market with platforms emerging all over the world (Buldeo Rai et al., 2017).
Marketing efforts	The actions of promoting CS, including market research and advertising.	Frambach & Schillewaert (2002) and interview with Jackson Amankwah	People must know about it (Amankwah, 2022, personal communication, 11th of April). Couriers are typically recruited online (Adams-Prassl & Risak, 2016).	
Perceived distribution of benefits and costs	The division between who gains from CS and who pays for it.	Feitelson & Salomon (2004) and interview with Jackson Amankwah	Costs are low because no large investments are needed (Mladenow et al., 2016).	Depends on the willingness-to-pay of customers (Amankwah, 2022, personal communication, 11th of April).
Perceived effectiveness	The perceived degree to which CS is successful in producing the desired results.	Feitelson & Salomon (2004)	High because of the possibilities for effective and efficient routing and matching (Ghaderi et al., 2022).	Low due to long detours and dedicated trips (Buldeo Rai et al., 2018; Ghaderi et al., 2022).
Platform infrastructure	The various features of the CS platform.	Geels (2002)	Features have the goal of ensuring user satisfaction, delivery safety, and security. Additional features make the platform more attractive to customers and couriers.	
Public opinion	Public opinion about CS.	Feitelson & Salomon (2004)	The public opinion about crowdshipping is less known.	
Public sector involvement	Participation of the public sector in CS.	Paloheimo et al. (2016)	Necessary step for crowdshipping to grow (Paloheimo et al., 2016).	Not necessary.
Routing and matching	Optimisation of trip allocation for CS couriers.	Giuffrida et al. (2021)	Efficient routing and matching improve effectiveness (Cheng et al., 2022; Wicaksono et al., 2021).	
Safety and privacy	The manner in which CS affects courier's and customer's risk to danger, or the degree of information sharing against their will.	Le et al. (2019), McKinnon (2016), Rougès & Montreuil (2014), interview with Jackson Amankwah	Risk that a package is stolen, lost, or damaged (McKinnon, 2016) or it contains hazardous or illegal items (Le at al., 2019; McKinnon, 2016; Rougès & Montreuil, 2014). Sharing personal information affects privacy (Fatnassi et al., 2015; Marcucci et al., 2017).	
Social influence	The degree to which an individual perceives that important others believe he or she should use CS.	Frambach & Schillewaert (2002) and Venkatesh et al. (2003)	Social influences may have network and scale effects, leading to greater effectiveness (Venkatesh et al., 2003).	
Technological niche	When CS is used by a segmented audience based on location, interests, demographics, and price.	Geels (2002)	Important but not complicated. The innovation is technologically advanced and able to break out of the niche.	
Technology	Crowdshipping.	Geels (2002)	Current literature mainly focused on routing-and-matching optimisation (Le et al., 2019).	
Techno-scientific knowledge	More knowledge about crowdshipping is necessary.	Geels (2002) and interviews with Thomas Robers and Sven Mittertreiner	The amount of courier remuneration must be known. Pilots must be conducted (Mittertreiner, 2022, personal communication, 28th of April).	
Trust and user acceptance	The extent to which users trust the innovation and are willing to use it.	Feitelson & Salomon (2004), Le et al. (2019), interviews with Thomas Robers and Jackson Amankwah, and focus groups	It is currently considered low. Insurance might provide trust (Amankwah, 2022, personal communication, 11th of April).	

Table 8.1. Overview of all SFFs for crowdshipping with explanation

8.7. Synthesis of previous analyses
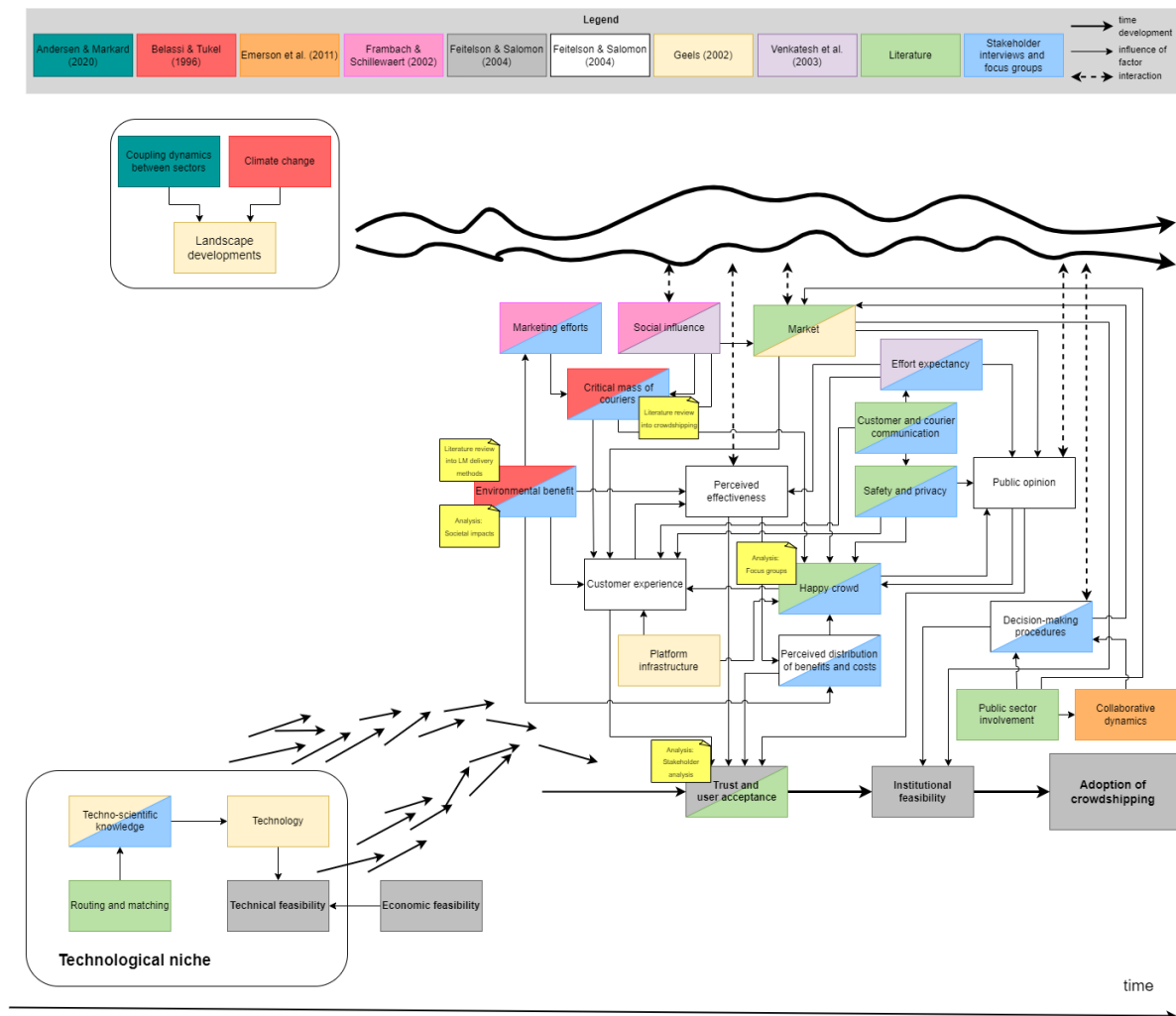
Figure 8.4: SFF framework showing the contribution of the previous SFF analyses in yellow

Figure 8.4 shows how the previous analyses contribute to the SFF framework.

First, the literature review into last-mile delivery methods concluded that crowdshipping is a promising delivery method to resolve last-mile problems. Moreover, several methods were evaluated based on costs, sustainability, and other aspects. These problems criteria can form the basis for SFF identification. This is shown in the SFF framework under *environmental benefit*. Namely, it departs from the sustainability aspects and the environmental problems that crowdshipping may resolve.

Second, the literature review into crowdshipping concluded that there are two significantly different manners of crowdshipping, namely value-driven and profit-driven. This influences the SFFs because a distinction between these manners is necessary for the SFF application. Moreover, one important difference between the manners regards the selection of couriers. This is shown in the SFF framework under *critical mass of couriers*.

Third, the societal impacts analysis concluded that the societal impacts highly depend on the crowdshipping manner. Value-driven crowdshipping has positive impacts on the environment and liveability, whereas profit-driven crowdshipping has negative impacts. The societal impacts could be a motivation for users to (not) participate in crowdshipping. Therefore, it affects the SFFs. One important societal impact is the environment. This is shown in the SFF framework under *environmental benefit*.

Fourth, the stakeholder analysis concluded that customers are the most powerful and interested

stakeholder. However, there are problems between couriers and customers, such as the lack of trust. Their power, interest, and problems affect their decision to (not) participate in crowdshipping. This is shown in the SFF framework under *trust and user acceptance*.

Fifth, the focus groups showed that participants of potential courier target groups have many doubts about crowdshipping. Their negative attitude can be considered an important potential failure factor that might affect other SFFs. This is shown in the SFF framework under *happy crowd*.

8.8. Interpretation of results

Figure 8.1 shows the SFF framework for crowdshipping (both value-driven and profit-driven). The framework departs from the step *technological niche*. *Technical feasibility* and *economic feasibility* must be met to break out of the niche. After that, the step *trust and user acceptance* should be completed. Then, *institutional feasibility* must be met. This will ultimately lead to the adoption of crowdshipping. These three steps will be discussed separately.

First, the step *technological niche* can be considered important but not complicated in the case of crowdshipping. The techno-scientific knowledge is available to break out of the niche. Also, the appropriate pricing model can be found to make crowdshipping economically feasible.

Second, *trust and user acceptance* forms a necessary step to attract a critical mass of couriers. In turn, a critical mass of couriers is necessary to attract a critical mass of customers. This is recognised as a chicken-and-egg problem (Frehe et al., 2017; Rougès & Montreuil, 2014). *Happy crowd* is an important factor influencing *trust and user acceptance* because satisfied couriers form the supply and influence effectiveness. This was also shown in previous analyses. This links with the necessity of having a *critical mass of couriers*. Next, the environmental benefits influence trust and user acceptance. Literature is very positive about the environmental benefits (e.g. Carbone et al. (2017) and Rougès and Montreuil (2014)). However, the societal impacts diagram showed that crowdshipping may have negative environmental impacts, especially with profit-driven crowdshipping (see Figure 5.1). Therefore, the environment could also be considered a failure factor on the trust and user acceptance. Finally, crowdshipping has not been implemented yet within the given scope. However, it can be concluded that *trust and user acceptance* have the potential to be successfully influenced by the factors in the framework. One key reason is the lower price customers pay, which is revenue for the courier on an already existing trip (Rougès & Montreuil, 2014). Trust, safety and privacy are aspects that should be closely considered by the platform.

Third, for the step *institutional feasibility*, it is highly important that relevant stakeholders collaborate with each other. For this, it is necessary to know whether crowdshipping will depart from a business or community orientation. This influences the legal and decision-making aspects. As crowdshipping is not yet in this stage, there is much unclarity about the factors influencing feasibility. Crowdshipping should be implemented on a larger scale before conclusions on institutional feasibility can be drawn.

Finally, it can be concluded that crowdshipping is currently in the *trust and user acceptance* step. Three important factors influencing this are *happy crowd*, *perceived effectiveness*, and *environmental benefit*. These need to be successful before the institutional feasibility factors become relevant.

9

Discussion

The previous five Chapters provided an analysis of one of the aspects of crowdshipping implementation in urban areas in the Netherlands. This Chapter first positions this thesis within existing research. Then, for each literature review or analysis, a discussion and implications for theory are stated. The story line of the discussion is composed of the following points: (1) What can be learned from the analysis, linked to the main RQ and the relevant sub question; (2) What were unexpected or remarkable results; (3) How does this analysis compare to previous research and what does it mean for future research; (4) How can this analysis be improved; (5) What implications does the analysis have for the SFFs. The implications for theory refer to the methodologies used in each analysis. For the literature reviews, the implications for theory refer to other literature. Finally, limitations are discussed.

9.1. Positioning this thesis within previous academic research

As mentioned in Section 4.1, existing research has mainly focused on routing-and-matching optimisation, organisational aspects of integrating crowdshipping into existing logistics processes, sustainability issues, business models, or behavioural aspects through preference surveys or choice models. This thesis differs from previous academic research because of four reasons. First, the scope of urban areas in the Netherlands has not been researched. Second, the thesis distinguishes between value-driven and profit-driven crowdshipping. This distinction has not been made in literature. Third, whereas previous research focused on the social or technical aspects only, this thesis aims to integrate this with a socio-technical view. Fourth, this thesis positions the societal impacts and SFFs in a framework. Previous literature has not shown a complete overview. Moreover, the added value is that links between factors and impacts are conceptualised.

9.2. Literature review into last-mile delivery methods

9.2.1. Discussion

From this analysis, it was seen that there are various last-mile delivery methods that differ in terms of costs, sustainability, or other aspects. Furthermore, they have different societal impacts including traffic congestion, noise pollution, or other (e.g. accidents, security, or land use). Crowdshipping was identified as a promising method into which research is lacking.

An interesting conclusion from this analysis regards the sustainability aspect of last-mile delivery methods. Despite the extent of the problems, not nearly enough has been done to decrease the environmental burden. This was concluded because most articles focused on costs aspects rather than sustainability aspects.

Compared to previous research, this literature review aims to identify the knowledge gap. Special focus was paid to the sustainability aspects of methods. This thesis aims to fill the knowledge gap by analysing crowdshipping and the corresponding SFFs. As to future research, this thesis recommends that more research be done into the sustainability aspects of last-mile delivery methods. Finally, this literature review could be improved if more articles were read, and if more criteria were used to evaluate the methods.

The implication of the literature review for the SFFs is that it determines the scope, namely crowdshipping in urban areas in the Netherlands. Moreover, it considers the importance of sustainability

aspects in delivery methods. This is seen in the SFF framework under *environmental benefit*.

9.2.2. Theoretical implications for literature
This literature review recommends that more research be done into the sustainability aspects of last-mile delivery methods, rather than mainly the costs aspects.

9.3. Literature review into crowdshipping

9.3.1. Discussion
This literature review answers the first part of SQ1, namely about the state-of-the-art. It was seen that existing research mainly focused on routing-and-matching optimisation or behavioural aspects through preference surveys or choice models. Research into urban areas in the Netherlands is very limited. Furthermore, it was seen that the biggest difference between crowdshipping and traditional LSP regards the usage of amateur versus professional couriers, respectively.

An interesting conclusion from this literature review is that this thesis distinguishes two manners of crowdshipping, whereas previous research considered all types of crowdshipping collectively. Moreover, it is remarkable that many articles consider profit-driven crowdshipping as the main manner, whereas other articles depart from the concept of "delivering a package on already existing trips" disappears. However, when interpreting "free capacity" from Buldeo Rai et al. (2017) as capacity in terms of time rather than in terms of space, profit-driven does fit the most definitions of crowdshipping. Moreover, it is impossible not to consider profit-driven as crowdshipping, because most articles and companies have adopted this manner. The second interesting conclusion from this literature review is the notion that many businesses have failed to implement crowdshipping. This thesis may play a role in identifying the SFFs that could have applied.

Compared to previous research, this literature review is the first to clearly distinguish profit-driven and value-driven crowdshipping. Considering all forms of crowdshipping collectively is rather confusing due to the significant differences in implementation and activities. Moreover, to obtain a clear picture of the societal impacts, stakeholders, and SFFs, it is important to consider the manners separately given the significant differences. As to future research, this thesis recommends that more research be done into the details of value-driven or profit-driven crowdshipping separately. Finally, this literature review could be improved if more case studies were conducted. This may help obtain a better idea of the state-of-the-art, the problems of crowdshipping, and how it could work in practice.

The implication of the literature review for the SFFs is that it determines the scope and creates the distinction between two manners of crowdshipping. This distinction implies that the SFFs should be considered separately as well. Moreover, the selection of couriers is apparently crucial. This is shown in the SFF diagram under *critical mass of couriers*.

9.3.2. Theoretical implications for literature
The literature review implies that considering all manners of crowdshipping at the same time is unclear. A distinction between value-driven and profit-driven crowdshipping is necessary. Therefore, future research should differentiate between those two manners.

9.4. Societal impacts

9.4.1. Discussion
From this analysis, it was seen that the societal impacts highly depend on the manner of crowdshipping. Value-driven crowdshipping may have positive impacts on environment and liveability. On the other hand, profit-driven crowdshipping has negative impacts on these. Moreover, both manners may have a negative impact on privacy, safety, and risk, because usage is made of amateur couriers instead of professionals.

An interesting conclusion from this analysis is that the societal impacts significantly differ between both manners of crowdshipping. Moreover, the negative impact of profit-driven crowdshipping on social cohesion is remarkable. The reason is that this manner causes people to think that they should always

receive remuneration for their effort, even when they deliver a package for friends or family.

Compared to previous research, this analysis aims to identify the societal impacts departing from the two different manners. As to future research, this thesis recommends that more research be done into the increase in demanded volume in case of value-driven crowdshipping. Currently, it is mainly based on assumptions that the sharing economy addresses a latent need. However, it is unsure whether this directly applies to crowdshipping. It is highly important information because the volume influences the resources, environment, and therefore liveability, industry, and transport resistance. Finally, this literature review could be improved by including more articles.

The implication of this analysis for the SFFs is that the societal impacts are relevant motivations for customers and couriers to adopt crowdshipping in one of the two manners. Whether these motivations are fulfilled influences the success or failure. Especially the impact on the environment is relevant for the success. This can be seen in the SFF framework under *environmental benefit*.

9.4.2. Theoretical implications for Van Wee et al. (2013)

The framework by Van Wee et al. (2013) provided an excellent basis for the construction of the societal impacts diagram for crowdshipping. For instance, the *transport resistance*, *needs and desires*, *way of using vehicles*, and *accessibility* were directly applicable to the crowdshipping case. However, some suggestions can be made for improvement of the framework. First, the box *volume, composition of traffic and transport, division over time and space* is rather general and more applicable to transport than logistics processes. Also, in some cases, it can be recommended to split volume and modality, because the first has a greater impact on *environment*, and the latter has a greater impact on *safety*. However, for crowdshipping, it was acceptable to combine them. Next, it appeared that *safety* was too broad for crowdshipping. Namely, it applies both to the safety aspects of the package and of the courier. For this reason, the aspects *risk and privacy* were added to make it more specific. Finally, it was noted that *environment, liveability, risk* do not match very well in crowdshipping. Namely, environment applies to pollution, liveability to the human aspect, and risk to the package. Therefore, it can be recommended to separate these. Finally, for crowdshipping, *resources* formed the intermediate step between *volume, composition of traffic and transport, division over time and space* and *environment*. This specification can be recommended because *volume, composition of traffic and transport, division over time and space* is rather broad. Finally, it can be recommended to add and specify the role of *industry* because they play a large role in growth and awareness of the innovation.

9.5. Stakeholder analysis

9.5.1. Discussion

From this analysis, it was seen that the customers are the most powerful and interested stakeholder. They influence the platform and the couriers because they set the conditions. The ministries, environmental interest groups and academic researchers have low power. The stakeholder analysis is important because the stakeholder's motivations and potential problems could lead to identification of SFFs.

An interesting conclusion from this analysis is that the customers are the most important stakeholder because they set the conditions for the platform, and by that, for the courier. However, the previous analyses indicated that the courier is the most important stakeholder.

Contrary to previous research, this stakeholder analysis aims to identify the power, interests, motivations, and problems for the value-driven and profit-driven manner separately. Additionally, previous research lacks identification of the problems between stakeholders. Moreover, relations between stakeholders were not before shown in a diagram. As to future research, this thesis recommends that more research be done into the problems between couriers and customers, distinguishing between the manners of crowdshipping. More importantly, it is important to identify how the problems could be resolved. Finally, this literature review could be improved if the proposals (value-driven or profit-driven crowdshipping) were explained in more detail. This way, it will be easier to identify the stakeholders' drivers. Also, it will be easier to identify what will be necessary to get all stakeholders on board, departing from which societal benefits aim to be achieved.

The implication of the stakeholder analysis for the SFFs is that the stakeholders motivation, interests, and problems could lead to SFFs. For instance, the problems between couriers and customers can be classified as *trust and user acceptance* problems, which is directly shown in the SFF framework.

9.5.2. Theoretical implications for Bryson (2004)

The PI grid, stakeholder influence diagram, bases of power - directions of interest diagrams, and stakeholder support vs. opposition grids have each highlighted a different aspect of the stakeholder analysis. However, there are two main points of improvement for Bryson (2004)'s method. First, the stakeholder influence diagram is unable to show the magnitude of the influence. Short arrows may appear less influential than long arrows, which is misleading. Therefore, a manner to indicate the magnitude of influence should be included, e.g. by arrow thickness. Second, in the bases of power - directions of interest diagram, it is sometimes unclear how each box should be interpreted. Especially the box *What they "see" - the lenses they use to interpret your behaviour* is difficult to assess when the stakeholder (e.g. the platform) is highly influential in the implementation. Then, this stakeholder is both the "you" and "they". Therefore, this should be specified by Bryson (2004).

9.6. Focus groups

9.6.1. Discussion

From this analysis, it was seen that in general, participants of potential courier target groups have many doubts about participating in crowdshipping. Their doubts regard the extra effort they need to invest, and liability issues.

This is an an interesting conclusion from this analysis because it does not match with findings from literature. For instance, Marcucci et al. (2017) finds that from university students, 87% would be willing to participate as courier. 93% would be willing to participate as customer. Punel et al. (2018) and Strulak-Wójcikiewicz and Wagner (2021) also report a positive attitude towards crowdshipping. This positive attitude could be attributed to the fact that people like to try something new (Paloheimo et al., 2016). Moreover, they could be motivated by environmental benefits (McKinnon, 2016; Punel et al., 2018) and community spirit (Lin et al., 2020). However, these perceived benefits are more complex and less impactful than expected. Additionally, it is possible that the results from Marcucci et al. (2017), Punel et al. (2018), and Strulak-Wójcikiewicz and Wagner (2021) cannot be directly translated from other European citizens to citizens of the Netherlands. A second remarkable finding is that the diversity in educational backgrounds of participants is apparently decisive in the way opinions are shared in the focus group.

Compared to previous research, this analysis aims to apply a participatory method rather than (stated preference) surveys. Moreover, the relevance of diversity has not appeared in literature on focus groups, nor in literature on crowdshipping. As to future research, this thesis recommends that more focus groups be conducted to determine whether the negative attitude is also found in groups with more or less diverse backgrounds. Also, focus groups with other courier target groups (e.g. stay-at-home mothers) would be interesting. Finally, this literature review could be improved if the focus groups were conducted in person rather than online. This might make it easier for participants to read each other's body language.

The implication of the focus groups for the SFFs is that the negative attitude could be considered an important potential failure factor. Aspects mentioned were unwillingness to invest time and effort, decrease of flexibility, low perceived effectiveness, and liability and security issues. A combination of these aspects can be found in the framework under *happy crowd*.

9.6.2. Theoretical implications for Morgan (1996)

Morgan (1996) raised five issues to design focus groups. These are *standardisation, sampling, number of groups, level of moderator involvement*, and *group size*. Based on the findings from three focus groups, a sixth issue can be proposed to improve the methodology. Namely, *diversity* describes how different educational backgrounds or living situations might affect the results of the focus group. Additionally, diversity considers how the interactions between participants influence results. For instance,

the moderator should prevent for one dominant participant to influence everyone else's opinions.

9.7. SFF framework construction

9.7.1. Discussion
The SFF framework is the part in which the conclusions from all previous analyses convene. The literature review into last-mile delivery methods emerges in *environmental benefits*, the literature review into crowdshipping can be seen in *critical mass of couriers*, the societal impacts analysis appears in *environmental benefits* as well, the stakeholder analysis emphasises the importance of *trust and user acceptance*, and the focus groups results are demonstrated in *happy crowd*. Additionally, the input of the SFF framework consisted of literature study, stakeholder interviews, and other frameworks. A general framework and two specific frameworks for value-driven and profit-driven crowdshipping were constructed.

From the SFF analysis, it was seen that crowdshipping is considered to currently be in the *trust and user acceptance* step. Three important factors influencing this are happy crowd, perceived effectiveness, and environmental benefit. These need to be successful before the institutional feasibility factors become relevant.

An interesting conclusion from this analysis is the chicken-and-egg problem within trust and user acceptance. The crowd must be happy and sufficient, which can only be achieved if the couriers are happy and sufficient, and vice versa.

Compared to previous research, this SFF analysis aims to provide a comprehensive and exhaustive overview of the SFFs, distinguishing between the two manners of crowdshipping. As to future research, this thesis recommends that more research be done into the factors influencing institutional feasibility. Currently, it is not relevant for crowdshipping implementation, but it will become relevant when trust and user acceptance factors are overcome. Finally, this literature review could be improved if more research is done into the influence of costs on other factors for the two specific manners.

9.7.2. Theoretical implications for Feitelson and Salomon (2004)
It can be concluded that the current framework by Feitelson and Salomon (2004) is lacking three main components. First, the *landscape developments* that were taken from Geels (2002). Feitelson and Salomon (2004) describe the *sanctioned discourse*, but the advantage of *landscape developments* is that it describes it as an evolving, time-dependent process. As it is less stable, it allows opportunities to emerge.

Second, Feitelson and Salomon (2004)'s framework lacks *trust*. Society is becoming increasingly risk-aware. Thus, it is important to understand public perception and concerns regarding innovations (Frewer, 1999). Besides trust from the user perspective, trust from the decision-making perspective is also important. Socio-technical problems attract many stakeholders, and they need to trust each other in their collaborations.

Third, Feitelson and Salomon (2004) is lacking focus on environmental aspects. In the current age, environmental benefits largely influence the success of an innovation. It impacts the perceived effectiveness, non-business interest groups, sanctioned discourse, and thereby social feasibility. Depending on the innovation, multiple factors can be linked to the environmental aspects. Various other frameworks emphasise the importance of environmental aspects, e.g. Belassi and Tukel (1996), Castillo and Pitfield (2010), Emerson et al. (2012), and Van den Bergh et al. (2007).

9.8. Implications for society
The implications for society highly depend on whether value-driven or profit-driven crowdshipping is implemented. Crowdshipping will have the biggest impact on the environment and liveability. In value-driven crowdshipping, the environment is impacted because the volume of delivery vans might decrease. This leads to a lower use of resources. Moreover, it leads to an improvement of liveability due to decreased congestion, nuisance, improved social cohesion, and improved healthy lifestyle. For profit-driven crowdshipping, the impacts are opposite. It has a negative impact on the environment and

liveability because an increase in volume can be expected. Both manners of crowdshipping have a negative impact on safety, risk, and privacy, because usage is made of amateur couriers rather than professionals.

Moreover, there are two big implications for society from the stakeholder perspective. The first implication is that, to make crowdshipping work, couriers must be engaged. In value-driven crowdshipping, couriers must be found who have sufficient environmental and community spirit to participate. In profit-driven crowdshipping, couriers must be found who are willing and available to work in a flexible manner. The second big implication is that both forms of crowdshipping provide possibilities for customers to have their package delivered in faster, cheaper, and more flexible way than with traditional LSPs. Two smaller implications for society from the stakeholder perspective regard industry and the government. For industry, profit-driven crowdshipping is another potential form of business. For the government, value-driven crowdshipping is another potential manner to improve last-mile delivery problems in urban areas. Finally, the SFF analysis shows that trust and user acceptance is an important factor. To make value-driven crowdshipping work, society must ensure that this is overcome. Local governments might play a role in this.

9.9. Limitations

Four main limitations were found. First, the limitations of the *societal impacts* through literature study are that it is impossible to read everything. This may lead to incomplete results. Additionally, only one case by Paloheimo et al. (2016) has been found where value-driven crowdshipping has been tested outside of a pure research setting. Many articles (e.g. Buldeo Rai et al. (2017) and Le et al. (2019)) cite this paper and base their results on this. The low number of tested cases may lead to inaccurate conclusions. Second, the *stakeholder analysis* has two main limitations. Several articles (e.g. Cheng et al. (2022) and Punel et al. (2018)) address both couriers and customers by "users". Therefore, differences between couriers and customers are neglected. Next, because crowdshipping has only been tested in the case by Paloheimo et al. (2016), the stakeholder analysis has relied on stated-preference surveys or discrete choice models for stakeholder's preferences. However, the lack of available data from tested cases is a limitation. Third, the *interviews* were conducted with three people. Two of them did not have much in-depth knowledge about crowdshipping in urban areas in the Netherlands because it is not seriously considered yet. The other interviewee was very knowledgeable about crowdshipping, but especially for longer distances in Norway. Although valuable lessons were learned from all interviews, it was critically assessed whether the provided answers matched the scope of this thesis. Finally, the *focus groups* had two main limitations. In the focus groups, participants were asked to reflect on a hypothetical situation. Thus, there may be a difference between the hypothetical situation and the actual situation. Moreover, the small sample size cannot be considered an accurate representation of the population. Finally, group dynamics can be highly influence the results.

10

Conclusions and recommendations for future research

The conclusion reflects on the conducted research and concludes what has been discovered, which was unknown before. Additionally, recommendations for future research are provided.

10.1. Conclusion and answer to the main research question

The aim of this thesis was to identify the success and failure factors of crowdshipping in urban areas in the Netherlands, and their implications for future implementation. The constructed SFF framework for both manners of crowdshipping shows that the SFFs can be divided into three steps, which are *technological niche; trust and user acceptance;* and *institutional feasibility*. Although the application and details differ slightly for the two manners, the the design of the framework is roughly the same. The first step is *technological niche*. It is considered important but not complicated, as the techno-scientific knowledge is available to break out of the niche. In profit-driven crowdshipping, *economic feasibility* is part of the technological niche, and it is assumed that it can be met with the appropriate pricing model. The second step is *trust and user acceptance*. It is necessary step to attract a critical mass of couriers. Relevant factors connected to this are *happy crowd* and *effort expectancy*. It can be concluded that crowdshipping is currently in this step in time. It was shown that a happy crowd can be achieved when they do not have to invest much time and effort. The third and final step is *institutional feasibility*. It emphasises that it is important that relevant stakeholders (e.g. platform and local governments) collaborate with each other.

The implications for future implementation are as follows. To make implementation work, it is necessary to investigate how the failure factors in the current step, namely *trust and user acceptance*, can be overcome. All analyses (societal impacts, stakeholder analysis, focus groups, and SFFs) showed that couriers want to put in as little effort and time as possible. To overcome the *user acceptance* failure factor, more research is necessary into how courier efforts can be minimised. This directly links with selecting the appropriate courier target group, who is motivated to participate. Additionally, routing and matching can be enhanced to increase *perceived effectiveness* and *environmental benefits*. *Trust* is important because customers need to trust the courier to deliver their package safely, whereas couriers need to trust customers not to send hazardous or illegal items. Relevant factors connected to this are *safety and privacy* and *customer and courier communication*. To overcome the *trust* failure factor, involvement of local governments can help increase legitimacy.

The sub questions relate to the state-of-the-art and societal impacts of crowdshipping. First, regarding the state-of-the-art, this thesis showed that there are various ways in which crowdshipping can be implemented. It differs between the market and commodity used (business-to-customer or peer-to-peer), distance range (e.g. urban or interurban), and the platform interface. Second, the biggest societal impacts regard *ways of using vehicles*; *safety, risk, and privacy*; and *accessibility*. In turn, they impact (among others) *transport resistance* and *volume, composition of traffic and transport, division over time and space*. The type of courier (traveller or dedicated courier) highly affects whether the societal impacts will be positive or negative. Namely, when travellers are used, the volume is expected to decrease due to less dedicated delivery trips, which causes the required resources to decrease. This has positive impacts on the environment and liveability. This manner is called value-driven crowdship-

ping because it departs from non-monetary values that might motivate travellers to participate, such as community spirit or concern for the environment. However, when dedicated couriers are used, the volume is expected to increase due to dedicated trips. For this reason, the impacts on volume, environment, and liveability are the opposite. This manner is called profit-driven crowdshipping because it departs from the profit that can be made. It can thus be concluded that crowdshipping implementation is most desirable in the value-driven manner with travellers.

Thus, the societal impacts analysis showed that couriers are an influential stakeholder. However, the stakeholder analysis showed that the customers are the most important stakeholder because they set the conditions for the platform. Thereby, they influence the couriers. Next, literature showed that the user acceptance is high, although focus groups with Dutch participants from potential courier target groups showed that, in fact, it can form a failure factor. It appeared that people want to invest as little time and effort as possible. They do not see that their invested time and effort are effective on a short trip in urban areas. The failure factor of user acceptance might be overcome by researching how courier efforts can be minimised. Moreover, trust issues (e.g. safety, privacy, and liability) are another failure factor. This failure factor might be overcome by involving local governments because it increases legitimacy. However, it is unsure whether these failure factors can readily disappear. Therefore, it is questioned whether crowdshipping is the most desired solution to resolve urban delivery problems.

Finally, it can be concluded that crowdshipping implementation could be feasible for both manners if the trust and user acceptance failure factor is overcome. It is essential to find couriers to participate. From a societal perspective, implementation is desirable if it is according to the value-driven manner. Then, it will yield positive societal impacts. If implementation is according to the profit-driven manner, it is undesirable for society due to the negative societal impacts. Thus, future research should focus on how the failure factor of trust and user acceptance could be overcome.

10.2. Recommendations for future research

Three types of research are recommended to investigate how the trust and user acceptance failure factor could be overcome. First, research into distance tolerances and expected remuneration is necessary. This should be done with a field-based pilot study rather than a survey because this is currently lacking in literature. This relates to *user acceptance*. Moreover, it should specifically focus on customers and couriers in the Netherlands because the willingness-to-pay and trust might be culturally-bound. Second, this pilot should investigate collaboration between stakeholders. This relates to *trust*. Third, an agent-based model can be constructed to gain insight into the emergent behaviour of couriers and customers. Once this is developed, possibilities for package consolidation should be investigated to increase efficiency and decrease costs.

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A

Literature considered

Table A.1 on the next page shows what literature has been considered for the Literature review into last-mile delivery methods in Chapter 3. Table A.2 on the next page shows what literature has been considered for the Literature review into crowdshipping in Chapter 4.

Title	Authors	Year	Journal
Reducing social and environmental impacts of urban freight transport: A review of some major cities	Browne, M., Allen, J., Nemoto, T., Patier, D., Visser, J.	2012	Procedia- Social and Behavioral Sciences
The e-commerce parcel delivery market and the implications of home B2C deliveries vs. pick-up points	Cardenas, I.D., Dewulf, W., Vanelslander, T., Smet, C., Beckers, J.	2017	International Journal of Transport Economics
Smart transport: A comparative analysis using the most used indicators in the literature juxtaposed with interventions in English metropolitan areas	Chen, Y., Silva, E.A.	2021	Transportation Research Interdischiplinary Perspectives
Environmental Sustainability in Third-Party Logistics Service Providers: A Systematic Literature Review Literature Review from 2000–2016	Evangelista, P., Santoro, L., Thomas, A.	2018	Sustainability
Characteristics of innovations in last mile logistics - using best practices, case studies and making the link with green and sustainable logistics	Gevaers, R., Van de Voorde, E., Vanelslander, T.	2009	Association for European Transport and contributors
Cost Modelling and Simulation of Last-mile Characteristics in an Innovative B2C Supply Chain Environment with Implications on Urban Areas and Cities	Gevaers, R., Van de Voorde, E., Vanelslander, T.	2014	Procedia- Social and Behavioral Sciences
The challenges in sustainability of urban freight network design and distribution innovations: a systematic literature review	He, Z.	2019	International Journal of Physical Distribution & Logistics Management
Integration of Urban Freight Innovations: Sustainable Inner-Urban Intermodal Transportation in the Retail/Postal Industry	He, Z., Haasis, H.D.	2019	Sustainability
Techniques for smart urban logistics solutions' simulation: a systematic review	Karakikes, I., Nathanail, E., Savrasovs, M.	2018	International Conference on Reliability and Statistics in transportation and communication
Research in urban logistics: a systematic literature review	Lagorio, A., Pinto, R., Golini, R.	2016	International Journal of Physical Distribution & Logistics Management
Evaluating the impacts of using cargo cycles on urban logistics: integrating traffic, environmental and operational boundaries	Melo, S., Baptista, P.	2017	European transport research review
The impact of e-commerce on final deliveries: alternative parcel delivery services in France and Germany	Morganti, E., Seidel, S., Blanquart, C., Dablanc, L., Lenz, B.	2014	Transportation Research Procedia
Trends of environmentally sustainable solutions of urban last-mile deliveries on the e-commerce market - a literature review	Mucowska, M.	2021	Sustainability
Green Logistics Development Decision-Making: Factor Identification and Hierarchical Framework Construction	Zhang, M., Sun, M., Bi, D., Liu, T.	2020	IEEE Access

Table A.1: Overview of selected literature into last-mile delivery

Title	Authors	Year	Journal
Promises and paradoxes of the sharing economy: An organizing framework	Acquier, A., Daudigeos, T., Pinkse, J.	2017	Technological Forecasting & Social Change
A Sustainable Crowdsourced Delivery System to Foster Free-Floating Bike-Sharing	Binetti, M., Caggiani, L., Camporeale, R., Ottomanelli, M.	2019	Sustainability
Shipping outside the box. Environmental impact and stakeholder analysis of a crowd logistics platform in Belgium	Buldeo Rai, H., Verlinde, S., Macharis, C.	2018	Journal of Cleaner Production
Crowd logistics: an opportunity for more sustainable urban freight transport?	Buldeo Rai, H., Verlinde, S., Merckx, J., Macharis, C.,	2017	European transport research review
Crowdshipping - the level of trust towards crowdshipping from a user's perspective: a stated preference experiment	Cebeci, M.	2021	https://repository.tudelft.nl/
Citywide package deliveries via crowdshipping: minimizing the efforts from crowdsourcers	Cheng, S., Chen, C., Pan, S., Huang, H., Zhang, W., Feng, Y.	2022	Frontiers of Computer Science
How to evaluate innovative ideas and concepts at the front-end ? A front-end perspective of the automotive innovation process	Dziallas, M.	2020	Journal of Business Research
Commission proposals to improve the working conditions of people working through digital labour platforms	European Commission - press release	2021	https://ec.europa.eu/commission/presscorner/detail/en/ip_21_6605
Bezorgd om maaltijdbezorgers	FNV	2020	https://www.fnv.nl/getmedia/dfbee842-a80f-4af1-8a16-c00d842ece65/Rapport-Bezorgd-om-maaltijdbezorgers-2-0.pdf
Putting the sharing economy into perspective	Frenken, K., Schor, J.	2017	Environmental Innovation and Social Transitions
Technological transitions as evolutionary reconfiguration processes: a multi-level perspective and a case-study	Geels, F.W.	2002	Research policy
On the spatial feasibility of crowdshipping services in university communities	Giuffrida, N., Le Pira, M., Fazio, M., Inturri, G.., Ignaccolo, M.	2021	Transportation Research Procedia
Matching supply and demand in crowdshipping: A theoretical framework	Kourounioti, I., Tsouros, I., Georgakis, P., Salas, A., De Bok, M., Pagoni, I., Tsirimpa, A., Pagoni, I., Thoen, S., Eggers, L., Polydoropoulou, Am., Tavasszy, L.	2020	Transportation Research Record

Rethink Mobility - Smart always wins - Interview with David Vuylsteke from PiggyBee	KPMG	2014	https://home.kpmg/be/en/home/campaigns/2014/05/smart-always-wins.html
Supply, demand, operations, and management of crowd-shipping services: A review and empirical evidence	Le, T.V., Stathopoulos, A., Van Woensel, T., Ukkusuri, S.V.	2019	Transportation Research Part C
Performance and Intrusiveness of Crowdshipping Systems: An Experiment with Commuting Cyclists in The Netherlands	Lin, X., Nishiki, Y., Tavasszy, L.A.	2020	Sustainability
The 4 A's of sustainable city distribution: innovative solutions and challenges ahead	Macharis, C., Kin, B.	2017	International Journal of Sustainble Transportation
Connected shared mobility for passengers and freight: investigating the potential of crowdshipping in urban areas	Marcucci, E., Gatta, V., Le Pira, M., Carrocci, C.S., Pieralice, E.	2017	Conference: 2017 5th IEEE International Conference on Models and Technologies for Intelligent Transportation Systems (MT-ITS)
Crowdshipping - a communal approach to reducing urban traffic levels?	McKinnon, A.	2016	(Logistics White Paper)
Transport reduction by crowdsourced deliveries - a library case in Finland	Paloheimo, H., Lettenmeier, M., Waris, H.	2016	Journal of Cleaner Production
Crowdshipping in last mile deliveries: Operational challenges and research opportunities	Pourrahmani, E., Jaller, M.	2021	Socio-Economic Planning Services
Studying determinants of crowd-shipping use	Punel, A., Ermagun, Al, Stathopoulos, A.	2018	Travel Behaviour and Society
Got a spare hour? Zipments.com will pay you to move something across town	Reister, C.	2011	https://www.mlive.com/business/west-michigan/2011/05/got_a_spare_hour_zipmentscom_w.html
Crowdsourcing delivery: new interconnected business models to reinvent delivery	Rouges, J.F., Mountreuil, B.	2014	1st International Physical Internet Conference
Mapping public support for climate solutions in France	Schmid, N., Guinaudeau, B.	2022	Environmental Research Letters
Strategic niche management and sustainable innovation journeys: theory, findings, research agenda, and policy	Schot, J., Geels, F.	2008	Technology Analysis & Strategic Management
Exploring opportunities of using the sharing economy in sustainable urban freight transport	Strulak-Wójcikiewicz, R., Wagner, N.	2021	Sustainable Cities and Society
Early adopters of new transportation technologies: Attitudes of Russia's population towards car sharing, the electric car and autonomous driving	Thurner, T., Fursov, K., Nefedova, A.	2022	Transportation Research Part A

Governance and Experimentation: a study on key mechanisms to facilitate learning processes in mobility transition experiments	Toering, A.	2020	https://repository.tudelft.nl/
Using combinatorial auctions for the procurement of occasional drivers in the freight transportation: A case-study	Triki, C.	2021	Journal of Cleaner Production
Success and failure of innovation: A literature review	Van der Panne, G., Van Beers, C.P., Kleinknecht, A.	2003	International Journal of Innovation Management
Innovatie in Transport: op zoek naar succes- en faalfactoren	Van Wee, B., Marchau, V., Kleinknecht, A.	2004	Colloquium Vervoersplanologisch Speurwerk 2004: Innovatie: van inspiratie naar realisatie: Rotterdam, CVS.
Market potential of bicycle crowdshipping: A two-sided acceptance analysis	Wicaksono, S., Lin, X., Tavasszy, L.A.	2021	Research in Transportation Business and Management

Table A.2: Overview of selected literature into crowdshipping

B.1. Framework by Van Wee et al. (2013)

Figure B.1 presents their conceptual framework for factors having an impact on transport volumes and the impact of the transport system on accessibility, the environment and safety.
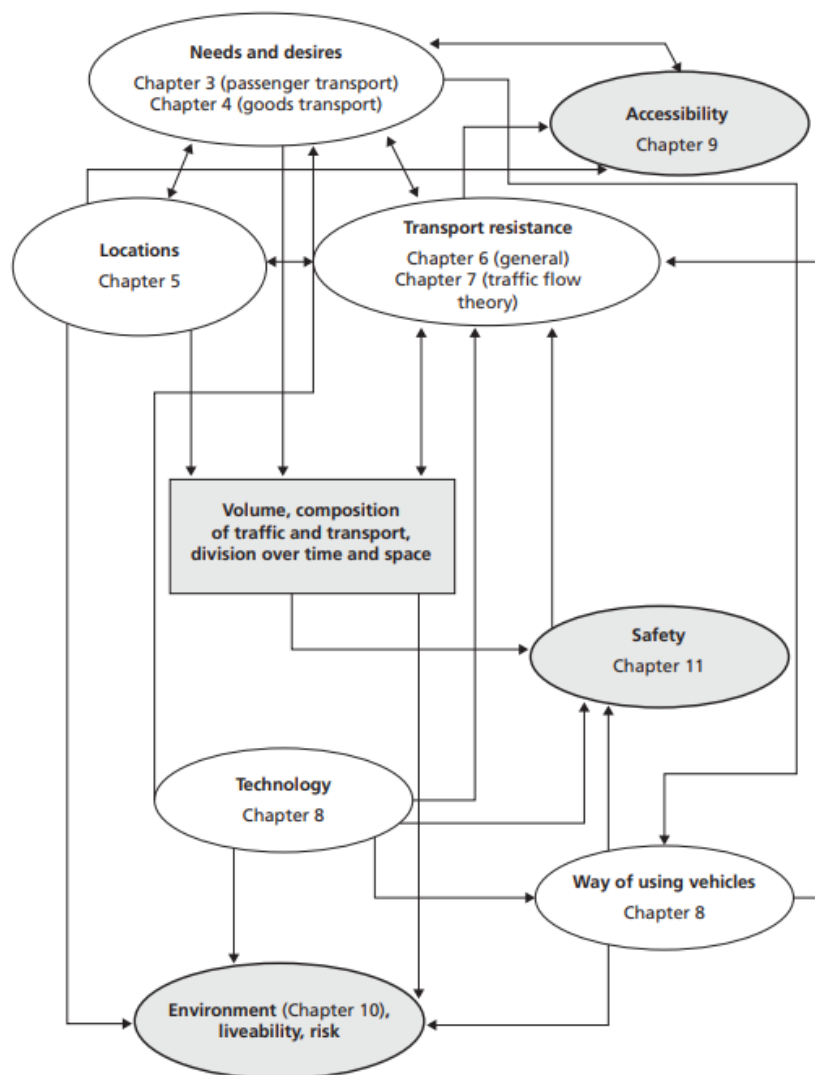

Figure B.1: A conceptual framework for factors having an impact on transport volumes and the impact of the transport system on accessibility, the environment and safety by Van Wee et al. (2013)

B.2. Bases of power - directions of interests diagram by Bryson (2004)

Figure B.2 shows the theory behind the Bases of power - directions of interests diagram by Bryson (2004). In this diagram, "they" refers to the stakeholder (e.g. couriers). "Your" refers to "implementation of crowdshipping".
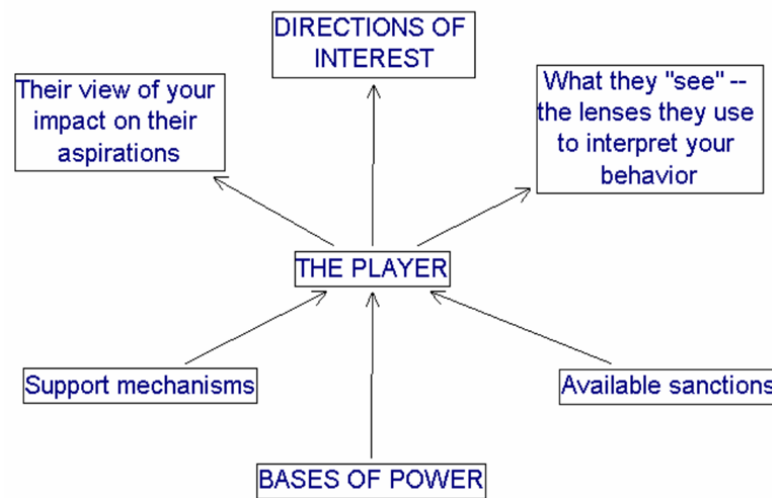
Figure B.2: Bases of power - directions of interest diagram theory

B.3. Theory for the SFF framework

This section presents the theory that was used for the construction of the SFF frameworks. It consists of the frameworks by Feitelson and Salomon (2004), Geels (2002), Venkatesh et al. (2003), Emerson et al. (2012), Andersen and Markard (2020), Frambach and Schillewaert (2002), and Belassi and Tukel (1996). They are linked as follows. Feitelson and Salomon (2004) present their political economy model of transport innovations. This forms the basis of the SFF diagram because they present a very generic overview for transport innovations. Geels (2002) presents his multi-level perspective on TT. Contrary to Feitelson and Salomon (2004), Geels (2002) adds the time dimension and calls it a technological transition. Venkatesh et al. (2003) present their Unified Theory of Acceptance and Use of Technology (UTAUT) model, describing the seven constructs that appear to be significant direct determinants of usage. Compared to Feitelson and Salomon (2004) and Geels (2002), Venkatesh et al. (2003) focuses more on the individual user aspects of the technology, rather than societal adoption. Emerson et al. (2012) present their integrative framework for collaborative governance. Feitelson and Salomon (2004) touch upon this in *decision-making procedures*, but do not provide the details like Emerson et al. (2012) does. Andersen and Markard (2020) present their map of multi-technology interaction and associated sectors. Whereas the previous frameworks focused on one technology only, Andersen and Markard (2020) consider the influence and interactions between multiple technologies. Frambach and Schillewaert (2002) present their conceptual framework of organisational innovation adoption. They take the standpoint of the organisation rather than society (e.g. Feitelson and Salomon (2004) and Geels (2002)). Belassi and Tukel (1996) present their schematic representation of success and failure factors. Similar to Frambach and Schillewaert (2002), they depart from an organisational point of view by considering a company that is to implement a project.

B.3.1. Framework by Feitelson and Salomon (2004)
Figure B.3 presents their political economy model of transport innovations.
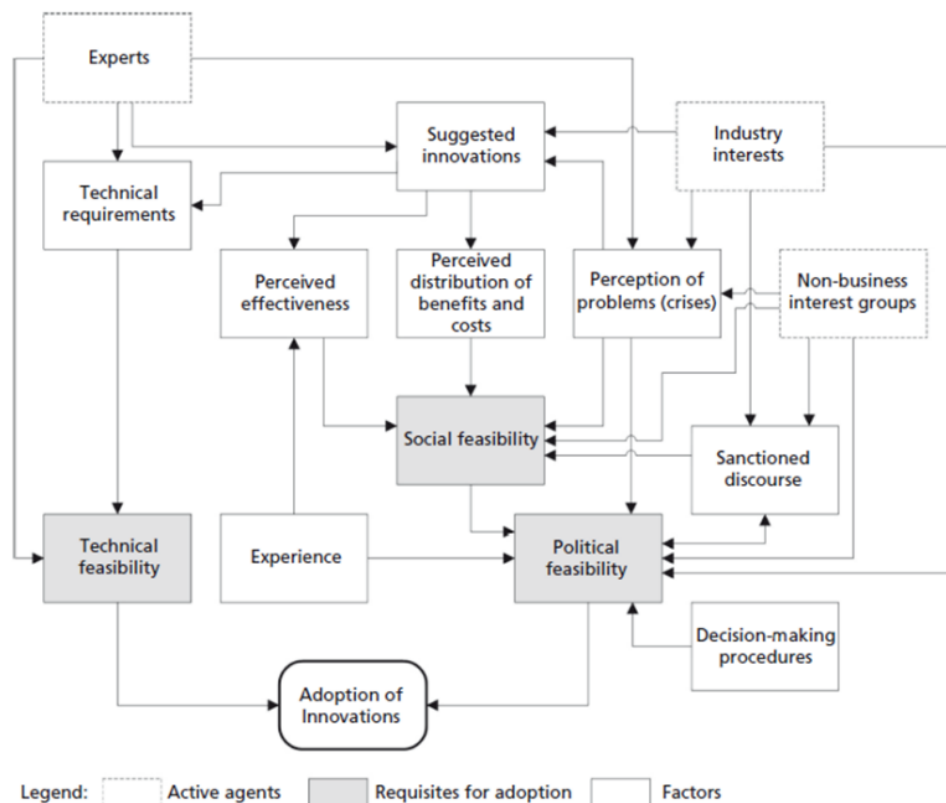

Figure B.3: A political economy model of transport innovations by Feitelson and Salomon (2004)

B.3.2. Framework by Geels (2002)
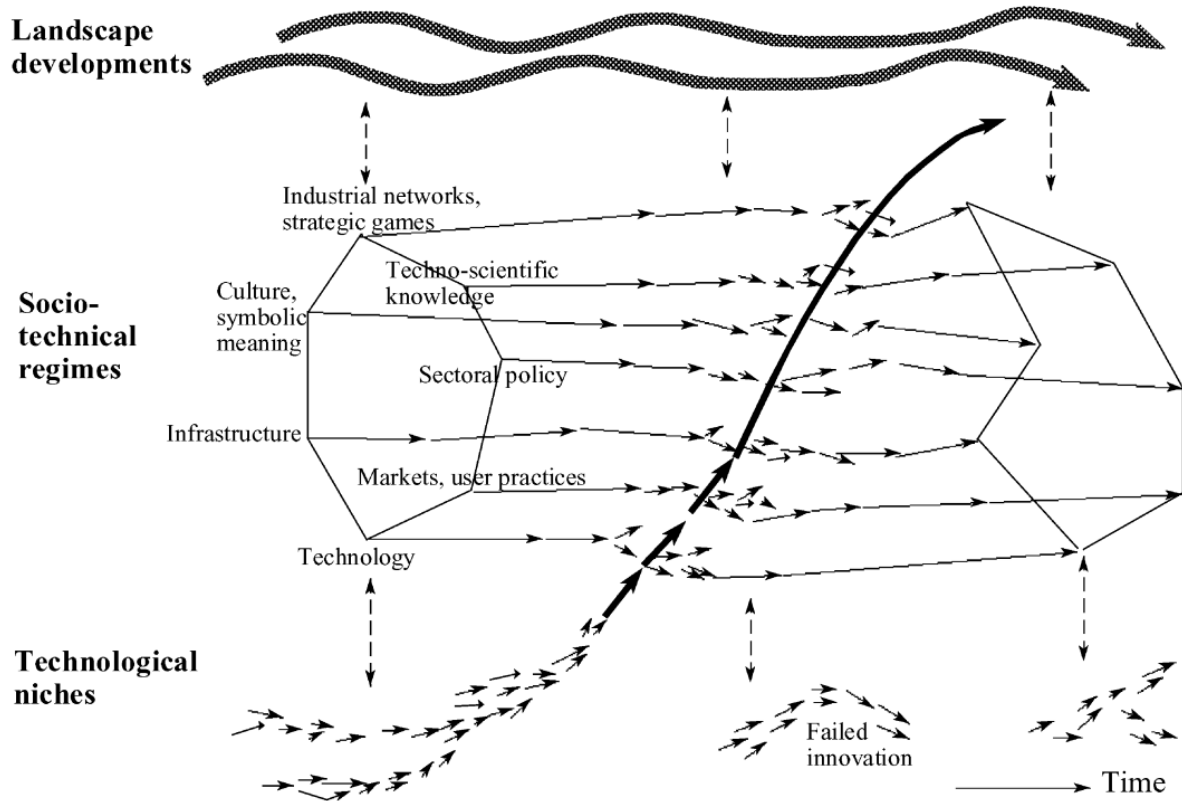Figure B.4 presents his multi-level perspective on TT.

Figure B.4: A dynamic multi-level perspective on TT by Geels (2002)

B.3.3. Framework by Venkatesh et al. (2003)
Figure B.5 presents their Unified Theory of Acceptance and Use of Technology (UTAUT) model, describing the seven constructs that appear to be significant direct determinants of usage.
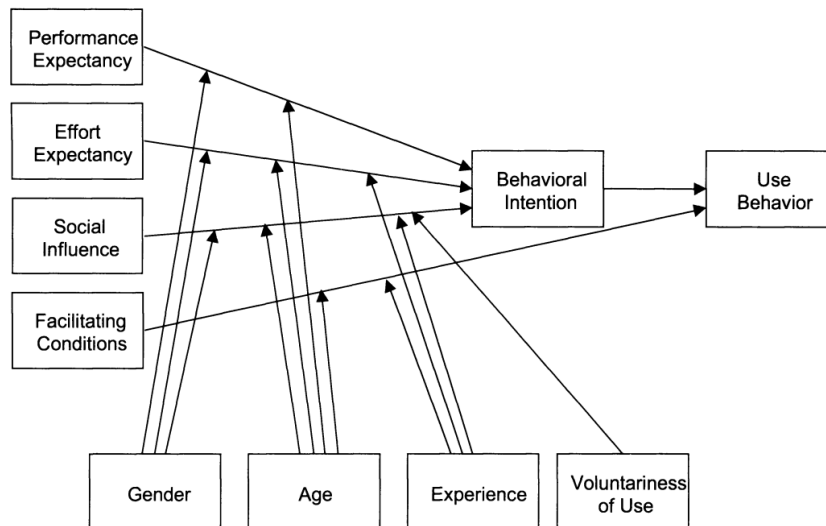

Figure B.5: The Unified Theory of Acceptance and Use of Technology (UTAUT) model by Venkatesh et al. (2003)

'

B.3.4. Framework by Emerson et al. (2012)
Figure B.6 presents their integrative framework for collaborative governance.
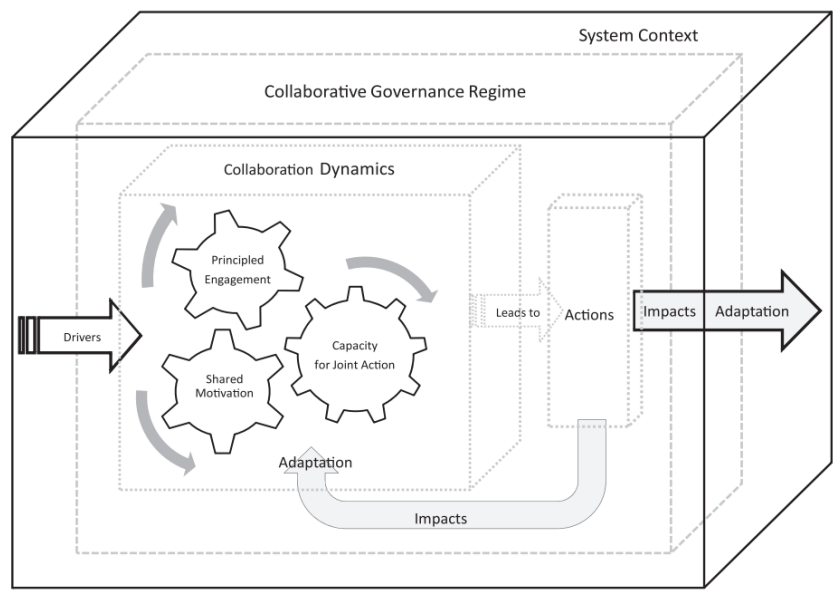

Figure B.6: The integrative framework for collaborative governance by Emerson et al. (2012)

'

B.3.5. Framework by Andersen and Markard (2020)
Figure B.7 presents their map of multi-technology interaction and associated sectors.
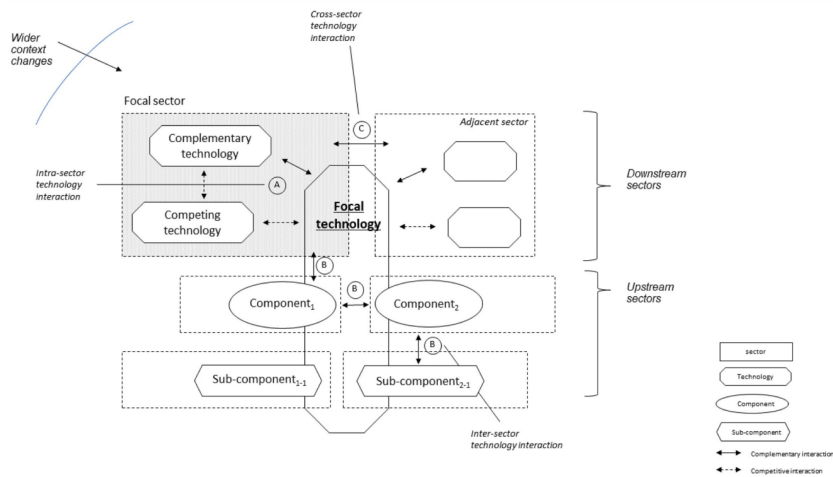
Figure B.7: Map of multi-technology interaction and associated sectors by Andersen and Markard (2020)

B.3.6. Framework by Frambach and Schillewaert (2002)
Figure B.8 presents their conceptual framework of organisational innovation adoption.
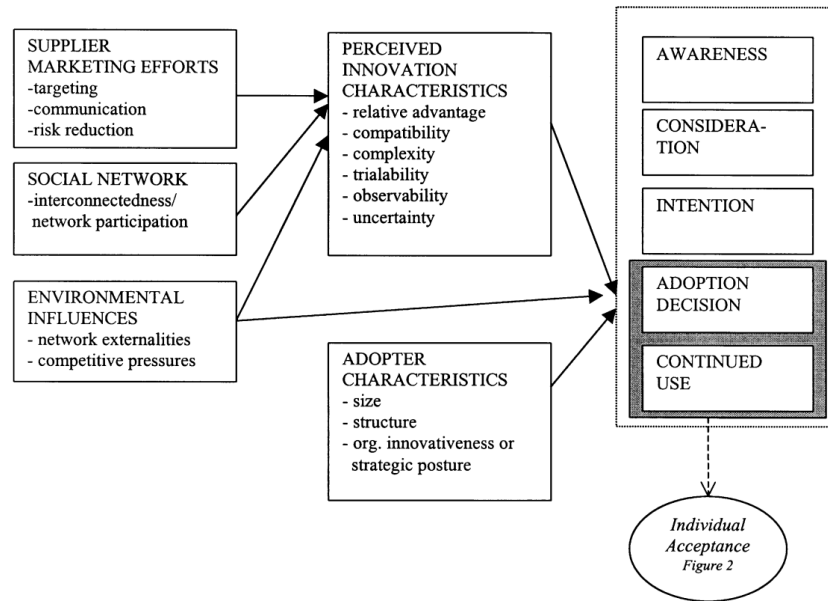
Figure B.8: A conceptual framework of organisational innovation adoption by Frambach and Schillewaert (2002)

B.3.7. Framework by Belassi and Tukel (1996)
Figure B.9 presents their schematic representation of success and failure factors.

Figure B.9: Schematic representation of success and failure factors by Belassi and Tukel (1996)

B.4. Framework by Bos et al. (2013)

Figure B.10 presents his framework for governance experimentation: design and organisation aspects.
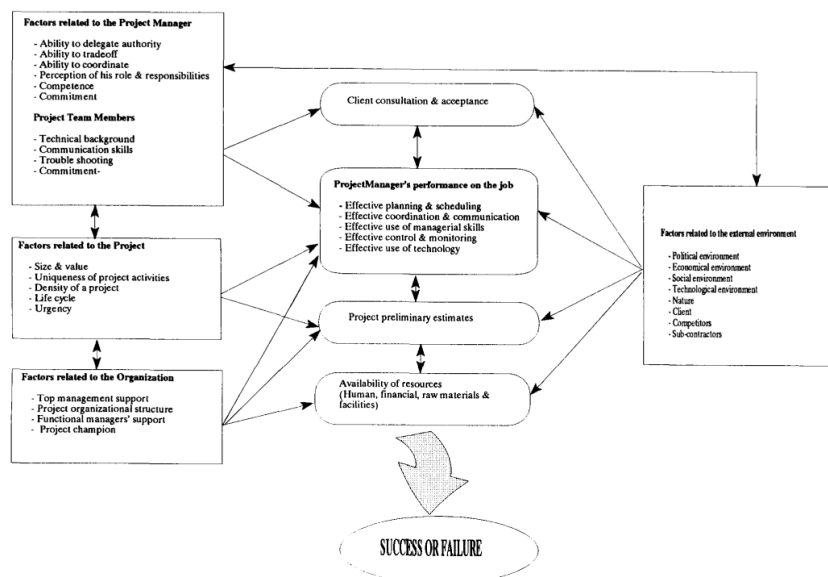
	Dimension	Definition	Example of this dimension in the Cooks River Sustainability Initiative (2007–2011)
Starting conditions	Shared learning agenda	A learning agenda aims to: provide meaning to efforts outline underlying assumptions guide operational environment of experiment	The Initiative's learning agenda focused on exploring perspectives and mutual inter-dependencies between municipal staff (themselves) and other catchment stakeholders. It also aimed to develop local context-appropriate solutions.
	Legitimacy	(Political) support to endorse and legitimise alternative and experimental policy processes	Political endorsement by the mayors of each of the participating municipalities.
	Resources	Dedicated financial resources to protect, develop, implement and complete innovative policy processes and technologies.	Availability of grant funding for proposal development and execution of Initiative with subsequent co-investment by participating municipalities.
Features of Design & Organisation	Focus projects	Local projects that draw in a wide variety of disciplines/stakeholders and generate understanding of systemic nature of problem situation in its local, contextual circumstances and develop alternative solutions and publics through social interaction.	Sub-catchment planning projects
	Multi-organisational peer groups (Executives, focus project leaders and experts)	Multi-organisational peer groups serve as multi-functional learning platforms through on-going exchange of diverse organisational, professional and/or technical perspectives and sharing of (learning) experiences derived from undertaking the focus projects.	Steering committee, executive champions committee, technical experts committee
	Distributed facilitation	Distributed facilitation recognises distributed roles and responsibilities to facilitate, guide and support (learning) processes and activities across a variety of actors at and between different levels.	Project manager, project team, steering committee members, university partners
	Science/Research	Partnerships with research institutions/researchers provide on-going experimental guidance and feedback.	Initiative was subject to on-going monitoring research while specific scientific input and expert advice was sought in early project development and at various stages of Initiative.
	Adaptability and flexibility	Room for adaptation of processes and activities to suit local context without losing objective of learning agenda.	The development of specific sub-catchment plans in six-sub catchments with differing context features across eight culturally diverse municipalities required adaptability and flexibility of processes and facilitating actors.
	Time	Time to develop learning processes, buy-in and/or mutual trust	It took considerable amount of time for actors to build trust and to understand and appreciate the complexity of the Initiative.

Figure B.10: Framework for governance experimentation: design and organisation aspects by Bos et al. (2013)
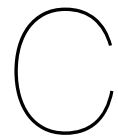
Transcripts and summaries of interviews

C.1. Preparations of all interviews
The bullet points as preparation for all interviews was as follows.

It's nice to meet you (online). First of all, I'd like to ask if it is okay if I record this meeting so I can put it in my thesis.I thought it would be good to start with a quick introduction round.

About my thesis: CS, what are the SFFs, what barriers need to be overcome to initiate CS in the NL? How? Literature research, analysis, interviews, experiment.

Now I'd like to start with some questions

- Could you tell about yourself and Next2Company/Nimber/your department at the Municipality of The Hague?

- Could you tell me how you're involved with CS? How are you involved in the LEAD project?

- What do you think are the biggest SFF? = factors that are important in initiation of CS. So e.g. available knowledge, restrictions from the legal perspective, whether it is easy to understand etc.

- When could you say CS is a success?

- What do you think is the current state of CS?

- What would need to happen for CS to grow?

- Is there a market for CS?

- Is there something you'd like to give me as advice, or something to think about?

Thanks for this meeting, I can send you the transcription. Is there anything I should exclude because of confidentiality?

C.2. Thomas Robers - Next2Company
C.2.1. Additional preparation
- Do you feel like the other parties (e.g. the municipality) want to collaborate?

C.2.2. Summary
General information about interviewee. Project Impact Manager at Next2Company. Company for strategy and concept development, B2B. Focus on Transport, Logistics and Mobility.

Their activities in crowdshipping. He helps develop the strategy for the LEAD project. Crowdshipping is one of the attention points of the LEAD project.

SFFs mentioned and why. *Target group*, because the couriers form the supply. *Gain knowledge* because currently, little is known about CS. *Willingness-to-pay, trust, user acceptance* because this is

again linked to the supply and demand.

Additional information. Says that he is not a CS expert. Recommends to look into deliveries that are uninteresting for traditional LSPs, because they are very far away or e.g. flowers with water.

C.2.3. Transcript
F: "Oké, ik zat te denken dat het misschien goed is als ik mijzelf eerst even voorstel, en dan wil ik ook graag van jouw kant horen hoe en wat. Nou ja, mijn naam is dus Floor Verwijs en ik zit in het tweede jaar van Complex Systems Engineering and Management, dat is de master aan de TU Delft die hoort bij Technische Bestuurskunde. En als onderdeel daarvan, ja, kijk ik naar crowdshipping, ehm, en ik kijk er eigenlijk vanaf een heel theoretische kant naar, dus ik kijk vooral, ja, ehm, wat is dit eigenlijk voor iets, en hoe kan dit eventueel van de grond komen in Nederland, en ehm, dan kijk ik vooral naar de succes- en faalfactoren hiervan, dus dat zijn dan dingen die, waardoor als dát goed loopt, dan kan crowdshipping een succes worden. En in het kader daarvan praat ik ook met mensen die hier iets vanaf weten, maar zoals je zelf al schreef, zijn er in Nederland niet zo heel veel mensen die er veel verstand van hebben. En ik doe natuurlijk literatuuronderzoek, en die gesprekken wil ik ook graag gebruiken om wat meer van die succes- en faalfactoren te kunnen identificeren. Dus dat een beetje in het kort."

T: "En Complex Systems Engineering, die opleiding is dus breder, en jij doet dan de richting logistiek, en dan in het bijzonder heb je crowdshipping gekozen, of...?"

F: "Ja, precies, er zijn drie richtingen, en ik doe dan de richting Transport en Logistiek, dus dat past er wel goed bij."

T: "Ja, ja, zeker, en is dat leuk?"

F: "Ja, ja, zeker, ik vind het echt heel interessant want het is, nou elke studie claimt dat ze heel breed zijn, maar ik heb het gevoel dat dit heel breed is omdat je binnen die drie richtingen ook zowel naar de sociale kant als naar de hele technische kant kijkt, en een beetje in het grijze gebied daartussen. Dus dat spreekt mij heel erg aan."

T: "Hmm, ja, oké, mooi, ja en hopelijk kan ik je ietsje verder helpen, en Rodrigo heb je volgens mij contact mee gehad?"

F: "Ja, ja, precies."

T: "En andersom ook, misschien kunnen we uiteindelijk ook van jouw inzichten wat leren, want wat je zelf ook al zegt, crowdshipping in Nederland is er nog niet echt. Ehm, zal ik even wat kort iets over mijzelf vertellen?"

F: "Graag!"

T: "Thomas Robers, ik werk nu drieënhalf jaar voor Next2Company. Voorheen werkte ik voor YSE, en bij YSE deed ik een projectmanagementtraineeship en dat vond ik ook leuk, ook vanwege de breedheid, wat je zelf als een beetje schetste. Dus YSE geeft eigenlijk de mogelijkheid om binnen verschillende bedrijven korte projecten van 6 maanden te doen, waardoor je in twee jaar tijd eigenlijk vier totaal verschillende bedrijven en verschillende projecten leert kennen. Maar wel met intensieve begeleiding vanuit het bedrijf, waardoor je je in een snelkookpan kan ontwikkelen. En toen kreeg ik door dat ik projectmanagement leuk vind, mits het inderdaad wel echt aan impact gekoppeld is. Dat is nu wel wat vanzelfsprekender, maar vijf jaar geleden was dat nog iets minder, dat alles duurzaam of sociaal moest zijn, en nu begint dat gelukkig een beetje te veranderen. En ik wilde graag wat ondernemends doen. Dus toen ben ik met Next2Company in aanraking gekomen. Next2Company helpt organisaties met strategie- en conceptontwikkeling. Dus vaak aan het begin: hoe moeten organisaties - we werken vooral met grotere merken - zich verhouden tot grote maatschappelijke ontwikkelingen, en hoe spelen ze daar strategisch op in. Maar wat wij heel leuk vinden is om het ook heel snel te vertalen naar oplossingen die getest kunnen worden. Dus pilots in de praktijk, om te toetsen: hoe werkt dit, is dit een

oplossing, en draagt het wat bij. Dat doen we in drie domeinen: transport, logistiek en mobiliteit is een van die drie domeinen. De andere zijn energie en transitie, en de andere is werk, inkomen, en wonen. En voor transport, logistiek en mobiliteit ben ik al wat langer actief. Ik beweeg overigens een beetje over die thema's heen, hoor, maar we zijn wel ooit begonnen om voor DHL een local-to-local concept op te zetten. En de basis daarvan was eigenlijk dat we zeiden: hoeveel procent van de pakketjes die lokaal worden verstuurd, kwam ook weer lokaal terecht. Dus we vroegen gewoon aan de DHL CEO, die wist dat niet, en ging het uitzoeken. Het bleek uiteindelijk een heel hoog percentage te zijn. En die gaan dan via distributiecentra, eh ja. Wij hebben Tilburg als stad gekozen, dus die gingen van Tilburg, naar Nieuwegein, en die kwamen weer terug in Tilburg. Wij hebben geprobeerd die uit het systeem te halen, dus om een complex systeem eigenlijk eenvoudiger te maken, en op de zelfde dag te bezorgen, ook nog eens. Want we dachten: nou, als we hem toch uit het systeem halen, kunnen we 'm direct bezorgen. Nou, dat was best wel leuk. En daar rolde uit dat er een Europees aanbestedingstraject kwam, en ik ga me even afvragen: wat heeft Rodrigo over LEAD verteld tegen jou?"

F: "Ja, nog niet zo heel veel eigenlijk, nee, meer dat jullie daar gewoon mee bezig zijn in Den Haag en dat het een Europees-gefundeerd project is."

T: "Ja, dat klopt, en er zijn zes steden die meedoen. Den Haag is één van die steden, en dan heb je nog vijf Europese steden. Het hoofddoel is: binnenstedelijke logistiek verbeteren. Ook heel zwaar gekoppeld aan modellen, dus Rodrigo maakt een Digital Twin om alles door te rekenen, maar wij zijn daar juist bij gevraagd om er meer een ondernemende projectstructuur in aan te brengen, door één, twee of drie pilots te gaan testen, gewoon in de praktijk. En dan kan Rodrigo dat doorrekenen in zijn model. We hebben er een poosje over nagedacht, hoe we dat gingen doen, in Den Haag, en we zijn nu eigenlijk op drie takken uitgekomen. De eerste is dat we vervoerders aan elkaar willen verbinden. Dus we beginnen met drie, maar wat nou als die slim uitwisselen waardoor het aantal kilometers wordt verminderd. Dus dat het zowel voor de vervoerder als voor Den Haag wat oplevert. En dan hebben we drie vervoerders die allemaal verschillende dingen kunnen, dus fietskoeriers, maar ook lockers, pakketkluizen, ik weet niet of je die wel eens hebt zien staan?"

F: "Hmmm hmm, ja."

T: "Als ik te snel ga moet je het gewoon zeggen."

F: "Nee, hoor! Gaat goed. "

T: "Oké, nou, en een partij voor versleveranties. Dus die probeert alles wat aan restaurants geleverd wordt, te consolideren en dan in één keer naar het restaurant te rijden, in plaats van dat de bakker, de groenteman, en de slager, allemaal los naar de restaurants rijden. Dan is de tweede tak crowdshipping. Dat is best wel een interessante en ook ingewikkelde, want er zijn natuurlijk niet zo veel voorbeelden. Maar wel, we hebben Nimber in ons netwerk, had Rodrigo je dat verteld?"

F: "Ja."

T: "Dus die zijn in Noorwegen hier al best wel goed in, dus die weten al wel dingen. En dan is de derde tak, en die komt later, maar dat zou een stap zijn, van hoe kan je dat dan weer óók combineren. Dus een vervoerder laat een pakketje achter in een kluis, en bijv. een student, als crowdshipper, neemt de last-mile voor z'n rekening. Omdat je een soort platform ontwikkelt dat slim bekijkt, cross-docking heet dat dan, hoe je dat op een slimme manier kan uitwisselen. Dus die zijn we aan het vormgeven, eigenlijk."

F: "Ja. En je had het net over restaurants, is dat alleen maar een voorbeeld of is dat echt waar jullie op focussen?"

T: "Ja dat is nu wel focus vanuit één van de drie partners. Dus we hebben gezocht naar drie..., dus zeg-maar voor die huidige vervoerders, die eerste tak, drie een beetje verschillende partners. Dus er zijn er twee die pakketten doen, maar dan op heel verschillende manieren, en eentje doet versleveranties.

Dus nu gaan we kijken: kunnen die versleveranties ook wat pakketten meenemen, of één van die twee pakketbezorgers heeft ook gekoeld vervoer, dus zou die hen kunnen helpen. Dus we focussen ons wel op hun huidige business. Dus daardoor hebben we nu ook versvervoer."

F: "Ja, ja. En je zei dat de derde tak is om het te combineren, is dat een soort van het einddoel, of is dat meer om te onderzoeken?"

T: "Ja, dat is wel een goede. We moeten eerst die eerste twee goed doen, en dan willen we nadenken over hoe die derde stap eruit kan zien, en hoe dat dan inderdaad gaat gebeuren, moeten we nog ontwerpen. Maar we zien iets voor ons van een open, logistiek, binnenstedelijk platform. Bijna een soort Uber-achtig platform misschien wel, waarin verschillende vervoerders leveringen kunnen uitwisselen."

F: "Ja, ja, en dan de klanten, of je de mensen die wat vervoerd willen hebben, zijn dus aan de ene kant restaurants die verse producten willen hebben, eventueel gekoeld, maar ook klanten voor normale pakketten. En je zei net dat de bezorgers, dat zouden dan eventueel studenten kunnen zijn, of kijken jullie ook naar andere doelgroepen?"

T: "Ja, voor die eerste tak beginnen we gewoon met beroepsbezorgers. En voor die tweede tak gaan we inderdaad crowdshipping beginnen met studenten. Die doelgroep leent zich goed, blijkt uit andere landen, en ook gewoon praktisch vanuit de TU Delft, is het vrij makkelijk om studenten aan ons te binden."

F: "Ja, dus dan onderzoek je met surveys of studenten daartoe bereid zullen zijn. Alleen jullie kijken natuurlijk wel specifiek naar Den Haag, en in Den Haag heb je natuurlijk wel, ja, minder studenten dan bijvoorbeeld in Delft. Hoe gaan jullie daarmee om?"

T: "Ja, we kijken naar de Hogeschool Den Haag, maar we pakken Delft ook mee. En we hopen ook wel een beetje dat er misschien wel veel studenten van de TU Delft in Den Haag wonen. Maar we kijken ook wel iets breder. Dus dat is een focus groep, maar als die de survey weer in hun netwerk verspreiden, dan mag iedereen meedoen aan die survey."

F: "Oké, en, zijn jullie ook al aan het kijken naar misschien het stukje legale aspect van crowdshipping, hoe mensen bijvoorbeeld een kleine vergoeding kunnen krijgen enzo?"

T: "Ja, daar willen we ook wel een beetje dat Nimber model voor gebruiken. Misschien, ik weet niet of Rodrigo dat voorstelde, misschien zou je ook hen kunnen interviewen, in het Engels, online als je dat zou willen. Dat is denk ik wel interessant. Ik kan je wel even koppelen aan iemand, zou je dat willen?"

F: "Ja, graag, ja."

T: "Dat gaan we regelen. Ja, dus zeker. En dat willen we ook toetsen in de survey. Dus we willen een beetje in kaart brengen: hoe reis jij, en zou je dit interessant vinden. Maar ook wel een beetje, Rodrigo noemt dat een Stated-Preference Survey, zou je voor zoveel euro, voor zoveel kilometer omreizen. Dat ga je eigenlijk dan een beetje uitzoeken."

F: "Ja, nee, precies."

T: "En daar moet gewoon een vergoeding tegenover staan, maar ook, zij hebben ook alles al geregeld qua verzekering en dat soort zaken."

F: "Oké, en hebben jullie een soort van benchmark waarop jullie kunnen zeggen: in dit geval noemen wij het een succes, of is het een geslaagd experiment of een geslaagde case?"

T: "Dat is een hele goede vraag. Zegmaar, het experiment gaan we nog wat verder vormgeven op basis van de survey. Dus in eerste instantie is het meer van: we willen gewoon een groot aantal resultaten op de survey, en we willen inzicht krijgen in voorkeuren en reisbewegingen van die studenten. En op basis daarvan gaan we het experiment ontwerpen, en dan gaan we wel weer nieuwe KPIs, die term

zal je vast kennen, opstellen, om te kijken: als we dat experiment gaan doen, wanneer is dat dan een succes."

F: "En wat zijn de KPIs waaraan jullie nu het succes afmeten?"

T: "Ik kan je wel wat doorsturen. Kijk, we hebben wel overkoepelend, voor het project: reductie van het aantal kilometers, reductie van de uitstoot. Specifiek voor die tweede tak, voor crowdshipping, zit ik even na te denken, hebben we die nog wat vager. Dus dan gaat het over wat ik net zei: inzicht vergaren. Maar we hebben nog geen harde doelstellingen daarover."

F: "Oké. En wat denk je dat de grootste barrières zijn om het te laten werken?"

T: "Ehm, nou, dat zal wel financieel worden. Dus, in Nederland zijn de marges op pakketvervoer heel klein. Dus er worden hele grote volumes gedraaid, heel klein beetje verdiend, maar omdat de volumes zo groot zijn is het interessant voor de grote partijen. En het komt ook een beetje: Nederland is voor paketbezorgers een walhalla, want we zijn superklein en we wonen met heel veel mensen op een hele kleine postzegel. En in Noorwegen bijvoorbeeld, wonen mensen heel ver uit elkaar. Dus er zijn veel pakketten waar vervoerders helemaal niet blij mee zijn: dan moeten ze heel ver rijden en maken ze op bepaalde pakketten eigenlijk verlies. Maar dat maken ze dan goed omdat ze in de stad, in Oslo zelf, maken ze weer winst. Wat je ziet gebeuren, is dat er daar dus die outliers, ofwel hele grote pakketten, ofwel die heel ver moeten, dat die juist worden opgepakt door crowdshippers. Dat komt ook met name doordat de betalingsbereidheid daar heel groot is. Het leven in Noorwegen is naturlijk sowieso wat duur. Maar ik vraag me af of in Nederland de betalingsbereidheid net zo hoog is als daar, en wij hebben natuurlijk niet zo veel outliers. Dus die twee dingen, dat maakt het wel heel spannend. Dat maakt Nederland bij voorbaat eigenlijk minder interessant voor crowdshipping dan Noorwegen, maar ik probeer dan altijd het basisidee van crowdshipping terug te pakken. Als er toch iemand van station A naar station B meeneemt en die kan twee dingen meenemen, dan zou dat altijd beter moeten zijn dan dat iemand gaat rijden. Dus dat gaan we testen."

F: "Nee, is ook zo. Want dat wat je nu zegt, in Noorwegen, dat gaat natuurlijk over veel grotere afstanden. Maar in Den Haag kijken jullie vooral echt binnen de stad? Hoe iets geleverd gaat worden?"

T: "Ja, klopt, maar stiekem trekken we dat al wat breder. Dus omgeving Den Haag, maar ook Delft. Dus juist ook voor die crowdshipping om dat wat beter te kunnen onderzoeken. Maar officieel gaat het project over binnenstad Den Haag, ja."

F: "Ja, oké, en..."

T: "Dus dat zou..., oh nee, ga door."

F: "Nee, nee, nee, ik wilde alleen zeggen dat, ja, dat onderscheid lijkt mij gewoon heel lastig. Want binnen literatuur wordt er vaak gezegd, van, het probleem is inderdaad dat er gewoon minder mensen tussen twee bepaalde steden reizen dan binnen een stad, dus dat er minder beschikbaar is aan bezorgers."

T: "Ja, dat geloof ik zeker. Zou ik wel heel interessant vinden, juist ook omdat Den Haag best wel een weidse stad is. Dus als iemand van de ene naar de andere kant wil reizen, kun je het ook wat breder trekken, zoals ik net ook stiekem deed. Bijna alle steden zijn daar wel aan elkaar gegroeid, dus Rotterdam, Den Haag, Delft, dat is eigenlijk één grote agglomeratie. Ik denk dat er best wel wat kruisbewegingen zijn. En de binnenstedelijke logistiek wordt ook verbeterd als er minder busjes van Den Haag naar Rotterdam rijden, die niet Den Haag in hoeven."

F: "Ja, precies. En kijken jullie ook naar bepaalde vervoersmiddelen, dus voor studenten natuurlijk de fiets, of misschien wel te voet. Zijn jullie daar ook mee bezig?"

T: "Ja, en forenzen hebben wij echt als doelgroep. Dus mensen die het OV nemen. Maar bedoel je

dan ook dat we voor die mensen een voertuig zouden regelen, of hoe bedoel je?"

F: "Nee, ik bedoel meer, ja, als natuurlijk één van die doelen is dat er minder kilometers gereden worden, dan moet je niet hebben dat veel mensen erg gaan omrijden. En op de fiets is dat natuurlijk minder een probleem. En dat hangt ook wel heel erg samen met de doelgroep van bezorgers die je beoogt. Dus daar was ik wel benieuwd naar, hoe jullie daarmee omgaan."

T: "Ja, fiets, en forenzen. Het zou wel interessant zijn, een beetje hardop denkend hoor. Kijk, het is prima als iemand met de auto van A naar B gaat, als hij toch sowieso zou gaan en een pakketje meeneemt. Als je een soort stip op de horizon, een soort Uber voor pakketjes, er zouden ook misschien wel mensen zijn die dit puur voor het verdienen doen. Dus die crowdshipper zijn, en dat ze niet aangesloten zijn bij een bezorgorganisatie. Dat is wel interessant om op te nemen in de onderzoeksvraag, even hardop denkend, want dat zou niet minder kilometers opleveren inderdaad."

F: "Nee. Denk je dat dat realistisch is?"

T: "Eehm, zo'n soort Uber voor crowdshipping?"

F: "Ja."

T: "Nee, voorlopig echt nog niet. Maar wij proberen wel, met innovatie, we doen heel erg in het klein tests, kleine pilots, maar je moet wel altijd aangeven: wat is het eindbeeld van wat je zou testen. Dus hoe zou dit eruit zien als het inderdaad wordt geadopteerd, iedereen gaat het gebruiken, en het wordt groot. Hoe ziet het er dan uit. Dus die link proberen we wel te houden."

F: "Ja, en het hangt natuurlijk ook een beetje van de definitie van crowdshipping af. Want als ik nu iets bestel, dat iemand mijn pakketje van A naar B gaat leveren, is dat nog wel crowdshipping eigenlijk, of is dat niet, ja, een ander soort service."

T: "Wat is jouw definitie van crowdshipping dan?"

F: "Nou, ik probeer wel echt te focussen op reizen die sowieso al gemaakt worden, ook al was dat pakketje niet, ja, daar geweest. Want ik vind het ook wel, vanuit duurzaamheidsoogpunt, wil ik helemaal niet onderzoeken hoe het vorm kan krijgen dat mensen gewoon een pakketje laten bezorgen, omdat ze dat graag willen. Maar ja, ik heb ook wel veel gelezen dat dit misschien wel iets is waar het naartoe gaat. Ook wat er met Uber gebeurd is, dat was eigenlijk ook hetzelfde concept. Dat mensen iemand meenemen omdat ze toch al in de auto zaten, en dat is ook helemaal veranderd. Dus, ja, dat vind ik wel heel interessant eigenlijk, om te kijken: hoe kan dat niet gebeuren."

T: "Ja, dat vind ik eigenlijk wel een goeie. En je inspireert mij ook om dat nog eens met Nimber te checken. Want Nimber doet 100% crowdshipping, maar ik weet dat zij ook vertelden dat er mensen het interessant vinden om met een busje, die hele rare outliers, waar veel betalingsbereidheid is, om die even rond te brengen. Maar dat is eigenlijk een zzp vervoerder."

F: "Ja, precies. Of dat je krijgt dat mensen die bijvoorbeeld voor PostNL bezorgen, toevallig toch even wat meenemen. Dat is ook een soort van "als bezorger werken", in plaats van "als vrije tijd". Nee, dat vond ik wel interessant."

T: "Moet je ook zeker vragen. Ik zal je aan Jackson, heet hij, koppelen, die loopt stage bij Nimber. Dus moeten we even kijken of dat nog zin heeft."

F: "Oh ja super, heel fijn. Ik had trouwens nog een vraag over, ja je vertelde dat jullie ook samenwerken met de gemeente Den Haag en de TU Delft. Zou je daar iets meer over kunnen vertellen?"

T: "Ja, even denken. De TU Delft die verzorgt eigenlijk de digitale kant. Dus wat we bedenken, Rodrigo maakt daar een model voor. Dat is natuurlijk in staat om door te rekenen wat de positieve effecten zijn.

En wat ik eigenlijk ook wel interessant vind, eigenlijk waar we net over fantaseerden: stel nou dat het voor de hele stad geadopteerd wordt, of voor heel Zuid-Holland. Hoe zou dat er dan uit zien? Heeft het dan inderdaad daadwerkelijk een positief effect op het aantal kilometers. Dus dat is een beetje hun taak. Dus Rodrigo is ook aan het kijken naar welke data is er al, ehm, en welke acties kunnen we modelleren. En dan hopen we dat we met die pilot resultaat behalen en dat we dat tegenover elkaar kunnen zetten met scenario testing. Gemeente heeft een faciliterende rol. Kijk, Den Haag is behoorlijk vastgelopen, van de binnensteden is het een van de slechtste van Nederland. Dus voor de gemeente Den Haag is dit een doel, en daarom hebben ze meegedaan, of hebben ze zichzelf aangeboden voor het project. Zij stellen bijvoorbeeld voor de eerste tak locaties beschikbaar waar wij pakketlockers neer kunnen zetten, om die eerste verbinding tussen vervoerders te maken. Ehm, wat ik ook wel interessant vind is dat gemeentes ook wel, gemeentes kunnen een rol spelen bij innovaties door te stimuleren. Dus dan doen ze een beetje wat ik net vertelde. Maar ook, op een gegeven moment komt er steeds meer regelgeving. Een bekend voorbeeld zijn de milieuzones die steeds verder worden ingevoerd. Op een gegeven moment komt er geen dieselbus meer binnen. Maar die kun je ook nog verder doorvoeren. Dus ik vind het ook wel interessant in het project om na te denken: hoe zou de gemeente Den Haag regelgeving kunnen inzetten, ofwel om die pakketvervoerders duurzamer te laten bezorgen, danwel om crowdshipping een steuntje in de rug te bieden. Autoluwe zones is een voorbeeld. Maar bepaalde, ik noem maar even wat geks, gemeentelijke belastingen, zouden ook een ding kunnen zijn. Nou, dat soort zaken zijn wel interessant: kijken hoe de gemeente dit verder kan stimuleren, maar ook gewoon, wat voor regelgeving zou hierbij kunnen passen. Ook wel goed om vooruit te denken: als je kijkt naar Felyx in Amsterdam. Dat is een hartstikke goed concept, maar één van de externaliteiten die dan nu optreedt is dat die scooters overal op de stoep liggen, en eigenlijk de hele stad een beetje vastloopt. Dat is net zo als met de Flinks en de Gorilla's. Kijk, om dat soort dingen een beetje van te voren over na te denken met de gemeente is natuurlijk hartstikke interessant."

F: "En lijkt het erop alsof ze daarin mee willen werken?"

T: "Ja, maar... ja. Eerste antwoord is ja, maar een gemeente is een veelkoppig monster. Dus zeg maar, wij krijgen een medewerker van de gemeente die ons helpt. En die is ook ambitieus en die wil ook alles graag, maar de meeste gemeente-collega's van hem weten niet eens dat dit project aan de gang is. Dus ergens anders word je misschien weer tegengewerkt door de gemeente, zonder dat ze het van elkaar weten. Dus dat maakt het lastig. En wat dan wel nodig is, en wat misschien ook wel aan ons project beter kan, is dat je helemaal vanaf bovenaf die doelstellingen mee krijgt van de wethouder. Dat je zegt: hier zetten we op in. En dat er vanuit daar in de verschillende divisies, voor wie dat relevant is, dat er meer openheid en transparantie is. Dus dat kan echt wel beter. Ik denk wel dat ze het zouden willen."

F: "Maar het is misschien nog niet zo heel erg prioriteit dat er meerdere afdelingen mee bezig zijn."

T: "Niet voor iedereen, in elk geval. Voor sommige mensen misschien wel, en voor sommigen misschien niet."

F: "Oké, en wat denk je dat, we hadden het net over betalingsbereidheid, denk je dat er nog meer verschillen zijn tussen die situatie in Noorwegen en in Nederland, waardoor het eventueel niet zou kunnen werken?"

T: "Nou, die betalingsbereidheid, en die bezorgingsdichtheid zijn echt de twee belangrijkste. Ehm..."

F: "Maar bijvoorbeeld aspecten zoals vertrouwen ofzo, dat wordt allemaal ondervangen door zo'n verzekering en dat loopt gewoon goed?"

T: "Dat vind ik wel een interessante. Vertrouwen. Ehm, durf ik niet zo te zeggen. Kijk, Scandinavië kenmerkt zichzelf natuurlijk door een nóg socialer stelsel dan hier. Dus misschien is het vertrouwen daar nog wel wat groter. Maar aan de andere kant, Nederland, van alle landen, lijkt best wel veel op Scandinavië. Dus misschien is dat wel enigzins soortgelijk. Maar ik vind het wel een hele mooie want heel veel van dit soort oplossingen... Kijk, technologie is niet het probleem. We hebben eigenlijk alle

technologie die we nodig hebben. Maar het zit inderdaad veel meer in die zachte kant, noemen we dat dan. Dus inderdaad het vertrouwen, de wil, de communicatie. Ehm, ik zou het niet weten, maar het is wel een hele mooie om het als onderzoeksvraag mee te nemen. Dus wat is het verschil in die softe capabilities, zoals we die noemen, tussen Noorwegen en Nederland."

F: "Ja. Nee, ik denk dat het ook super interessant is want dat zijn natuurlijk ook problemen. Je moet iemand wel vertrouwen met jouw pakketje maar ook andersom wil je niet dat jij iets raars moet vervoeren voor iemand."

T: "Ja, en gewenning speelt ook een rol. Dus als al heel veel mensen het hebben gedaan, dan vertrouw je het. Dus hoe start je dat op. Maar wat denk jij zelf, of heb je hier al iets over gelezen toevallig?"

F: "Ja, vertrouwen is een heel groot probleem, dat wordt vaak genoemd. Dus om die redenen die ik net zei. En ook wel een stukje privacy, omdat, vaak gaat het ook samen met GPS tracking, dus dat je weet waar de bezorger op dat moment is. Anderzijds weet de bezorger ook waar jij woont, ehm, dus dat zijn nog een beetje problemen die worden genoemd in literatuur."

T: "Hmmm ja, en gemak? Wat zegt de literatuur daarover?"

F: "Nou, er wordt eigenlijk alleen maar geschreven dat het juist meer gemak brengt voor de klant, omdat ze vaak wat meer flexbel zijn in wanneer het bezorgd wordt en omdat het ook persoonlijker is, waarderen mensen het weer. Dus dat schijnt geen probleem te moeten zijn."

T: "Oké, interessant."

F: "Ik zie dat we nog twee minuutjes hebben, ik vroeg me af of er nog dingen zijn vanuit jouw kant waarvan je zegt: dat hebben we nog niet besproken, maar hier moet je zeker over nadenken."

T: "Oeh, goede vraag. Ik vond sowieso dat je het goed hebt voorbereid hoor, goede opbouw, en goede verschillende vragen. En nogmaals, ja sorry, ik ben ook geen groot crowdshipping expert. Jij hebt er waarschijnlijk meer over gelezen dan ik."

F: "Nee, maar het is juist heel leuk om hier over na te denken en van andere kanten te kijken."

T: "En je hebt mij ook wel geïnspireerd om de soft capabilities en over wat nou als mensen crowdshipping als beroep gaan doen. Dus dat zijn wel leuke dingen. Ehm, wet- en regelgeving hebben we het over gehad, nee, het zou interessant zijn maar daar heb ik ook geen antwoorden op, dat we in Nederland wat meer gaan uitzoeken dat crowdshipping ook interessant zou kunnen zijn voor DHL en PostNL. Dat ondanks de dichte bezorgingsdichtheid, dat er toch ook pakketten zijn waar zij niet blij mee zijn. Ik weet vanuit mijn eerdere samenwerking met DHL dat zij bijvoorbeeld niet blij zijn met water in hun voertuig. Dus, bloemleveringen worden tegenwoordig op water gedaan. Dat vinden zij eigenlijk helemaal niet tof. Dus dat zou misschien een markt kunnen zijn die als een soort accellerator voor crowdshipping werkt in Nederland. Dat is misschien voor jou wel interessant om te kijken, zijn er nog meer van dat soort segmenten. Want het gaat eigenlijk altijd om outliers. Dus te groot, soms ook te snel, iets met water, of te ver weg. En misschien is te ver weg in Nederland ook wel van toepassing, weet ik niet."

F: "Ja, Waddeneilanden ofzo. Ja, nee dat zou best kunnen. Oké! Heel erg bedankt voor dit gesprek in elk geval. Ik ga dit allemaal uittypen, als je wil kan ik het ook naar je sturen zodat je het nog even kan lezen voordat ik het in mijn scriptie zet."

T: "Daar vertrouw ik je wel mee. Ik vind het wel leuk om je scriptie ook te ontvangen tegen die tijd."

F: "Ja, zeker! Dat wordt de zomer, maar nee, dat zal ik dan sturen. En als je nog een emailadres van Jackson, was het?"

T: "Ja, ik stuur jullie allebei even een mailtje. Dan introduceer ik jou, en dan kunnen jullie het verder

samen afhandelen."

F: "Ja, super. Heel erg bedankt, en dan hoor ik het graag, en dan laat ik ook even mijn scriptie weten als die af is."

T: "Prima. Graag gedaan, en veel succes."

F: "Komt helemaal goed."

T: "Alright, dag!"

C.3. Jackson Amankwah - Nimber
C.3.1. Additional preparation
- What are problems Nimber encounters?

- What are problems the couriers encounter?

- What are problems the senders encounter?

- What are legal issues?

- What is the next step Nimber should do in order to grow?

- Do you collaborate with other parties, e.g. governments?

- What do you think are major differences between Norway and the NL regarding CS?

- Could you tell me about what you're doing as part of the LEAD project?

- How often do people request the refund from the insurance?

- How do you do marketing?

- How important do you consider the happy crowd?

C.3.2. Summary
General information about interviewee. Jackson works for Nimber, a Norwegian start-up in crowd-shipping.

Their activities in crowdshipping. At Nimber, Jackson does all kinds of things. He also did his thesis on CS, namely a case study in the city of London, focusing on people's willingness to perform CS.

SFFs mentioned and why. *Trust* because this is crucial for people's willingness to perform CS. Nimber has various ways to increase trust. In general, Norwegians trust these types of businesses. *Customer and courier communication* is important because it increases trust. He sees that people communicate about the size of the package, delivery times, etc. *Marketing* is important to recruit people.

Additional information. Jackson is really an expert on CS. However, logically, he focuses on the commercial aspect. It seems that there are quite some differences between Norway and The Netherlands that might be relevant. E.g. willingness to participate, willingness-to-pay, and the distances travelled.

C.3.3. Transcript
F: "Alright, it should work now. Yeah, thanks again for this meeting, and for your time. I though it would be good to start with a quick introduction round. So, my name is Floor and I am writing my thesis about crowdshipping as part of the Faculty of Technology, Policy and Management at TU Delft. So it's kind of different than what Rodrigo is working on because my thesis is mainly qualitative. So I'm focussing on crowdshipping and the SFFs of that, and what barriers need to be overcome to initiate crowdshipping in The Netherlands. I'm basically doing a lot of literature research, analysis, interviews, and I will try to design an experiment but it will not be actually tested. Yeah, so that's shortly about me."

J: "Okay, my name is Jackson, and I work with Nimber. It's a start-up so I kind of do a lot of stuff, a little bit of almost everything. But with Rodrigo we are working on an EU project. And they are using Nimber's platform, trying to implement it in The Hague. And that's how I got in the EU project. I also wrote my master thesis on crowdshipping willingness of people to perform CS, with a case study in the city of London. Yeah, so I also had one student from TU Delft as well, and she did trust in CS."

F: "Yeah, that's Merve, I think?"

J: "Yeah, I think so."

F: "Yeah, I also spoke to her. And what were the outcomes of your thesis?"

J: "Yes, it was just to confirm, and actually, yes, there were a lot of people who were willing to do CS. But we had a few constraints, specifically in London. We did it in two ways. One was using public transport, and the other was people using their own transport. And people were more willing to do it in their own transport than public transport. Because in the public transport, sometimes they had to alight, you know, deliver, come back to public transport again, and people were not willing to cope with that inconvenience. But if it was at their end location, where they were going to leave anyways, it was easier for them to do the delivery. So it was looking into the ways. But generally, they were willing to do CS."

F: "Okay! And what target group did you take?"

J: "Ehm, we didn't specify anyone. So it was just the city of London. Anyone, from any age group, anybody. I just wanted to encompass the whole city of London actually."

F: "Well, that's really interesting that people are willing to do it, but they don't want to put a lot of effort in it."

J: "Yeah, they want the money but not the hassle."

F: "Yeah, that makes sense. Could you tell me a bit about what you're doing as part of the LEAD project?"

J: "With The Hague... Actually, we work with Oslo and The Hague. With The Hague, we don't do much. So we are giving... Nimber has a crowdshipping platform that The Hague wants to implement. So we are just giving them our platform, just changed the location, and they are trying to see if it can fit in The Hague. So we are not doing much. And with our platform... I'll run you through how it works, maybe that'll give you a propoer understanding of how... So, it's like Uber. So we have the bringer, where the bringer here is the person who is driving. And the sender is the one who wants to send something. So I register at the platform, and I post a task. And you are moving from, let's say Oslo to The Hague. Then, I post again, okay, I can give a person 200 euros, 300 euros, and they are like: cool, I'm also going to The Hague from Oslo. You pick the item, but you *have* the opportunity to change the price. So you come to me directly. And you're like: okay, I want to go, but I need more money. Mostly, the prices go up. In very few occasions, the prices went down. But mostly, prices go up. So you are like: okay, I think I am going there but I want 300 euros. I think 200 is less, I want more. If they agree, then it works. Then we [Nimber] get a fee. Nimber gets a commission on the transaction, so we are the service provider. And then it works. So basically, that's the whole concept of what we do. The one thing we have... So with this service, you as the driver, you can be a business. You don't necessarily have to be an individual. Whether you are a business, or an individual, you can do business with us. As long as you've registered. So if you're a business and you transport things from A to B, and you think you have extra capacity and you can pick up something, that's okay. You pick it up, and it's done. So it's from the business and individual: anyone could join."

F: "Okay. And do you think... do you know the share of people who are drivers as a business, or in their free time, or..."

J: "It is possible to estimate.. I don't have it off-head, but it should be possible. Because when you are registering, we ask you: are you a business, or an individual. So that should be data that can be retrieved. I don't have it off-head, but I think there are more individuals than businesses. And even the businesses that are here, are not *really* doing it as a business. Now, people work like part time, and they are like: okay. They log in and just go back and forth."

F: "And do you know, approximately, in how many cases it does work out to find a match between a driver and a sender?"

J: "I don't want to give you information off my head, wrongful information..."

F: "Yes, I get that."

J: "We have those data. Because I have given them to other people. So we do have it. But I don't want to give you any data off my head, and it doesn't end well. But I know we have those data. So I will write them down and send it to you."

F: "That would be great!"

J: "Okay, so the first one was business and individuals. And the second one was success rates, and if I'm getting it right: it's when they post a task, when it's done, or...?"

F: "Yes, when there's actually a match, or when it's accomplished."

J: "This would be tricky. Because sometimes, there are some tasks that take as long as three months to be completed."

F: "Ahh, okay."

J: "So, it wouldn't be... Whatever information you get, might not be the true situation of what's going on. So, because I see some tasks from January, and you know they talk, and normally, people use the service when it's not urgent. Because our maximum insurance is 1000 euros. So if you think what you're sending is very valuable, more than 1000 euros, we wouldn't recommend to use it. But if you use it, the maximum we can give you is 1000 euros. And if you need something urgently, I don't know if you should use CS, that's all. It's gonna take a long time to find other people going to the start and end place you wanted to go to, so I don't know if that is a good data to take. But at least, if you still want to have the values, you can get a fair idea of the constraints. So I can get that for you as well."

F: "Yes, that would be nice. Yeah, I think it would still be interesting, even though there is a lot of, yeah, things to consider with that. And do you know, or do you actually have information on what people send, or do they keep that private?"

J: "Yes, we do. So, we have categories of what is sold. Category A is something that fits in a pocket, category B is something that fits in a backpack. C is something that fits in a small car, with 4 or 5 seats. Then category D is something that fits in a van. And E is something that fits in a very big van. So we use that. We don't use dimensions because if someone wants to send something, not everyone has tape to measure and all of that. But if you tell if it fits in a pocket, at least you have a fair idea. And we also ask them to state an example of what it is. Is it a chair? Is it a table? Is it a laptop? Is it a phone? Is it, whatever? So you state that so you can get information on that as well. So yes, we have something. I should have an Excel file that might not give you everything you're asking, but it might give you a fair idea of some information you can extract. So we have the size, so as I told you, A-E, so you can see the types of things we ship. You can also see when a task is posted and when a task is delivered. So those two dimensions can be seen. I can get that too for you."

F: "That would be nice. Because it is really interesting, ehm, I read a lot in literature about how there could be trust issues for the driver. He does not want to transport something that might be hazardous or something, so that's why I think it's really interesting to know. Do you often have problems with that?"

J: "No. Funnily enough, we rarely have problems with that. Because you can see what you're trying to transport. When it's hazardous, and it's delicate, people actually don't use the crowdshipping platform. We normally get furniture: wardrobe, tables, chairs. Occasionally, we have stuff: a very long rope, or something you wouldn't expect someone to send. But mostly, we get stuff that the traditional logistics providers wouldn't want to take. So we hardly get parcels. Because parcels are effectively done by DHL or other postal services. We hardly get parcels, but you know, irregular stuff that has irregular shapes, irregular sizes, things like that."

F: "Okay. And what do you think would need to happen for crowdshipping to grow?"

J: "Ooh. I think the growth of crowdshipping will be difficult if we try to do it generically. What I'm trying to say is: it's based on country-on-country basis. What I noticed in Norway, is that a lot of people trust the system. So people are not scared of doing businesses online because they know that whatever happens, they are going to get their money back. And they trust the system so much. This is what I think has contributed to the growth of crowdshipping in Norway. So a online business here generally flourishes. Not because the business is necessarily good, but because people trust it: if I call, I'm gonna get to someone. And if I not get to someone, I can get my money back. Through whatever means, I'm gonna get my money back. So I think the trust factor is very crucial. And communication. Apart from that, I think, yeah, trust plays a major role in CS. Because if you're in a country where you don't even trust yourself, that you would deliver someone, you wouldn't trust someone else delivering it. So I think trust plays a major role. And one last thing: insurance also plays a major role. Because if I know that whatever happens, I'm gonna get 1000 euros, and my item is 200 euros, I don't mind. I'm willing to try."

F: "Okay. And are there any other mechanism, besides the insurance, that you implemented to increase trust?"

J: "Communication. So we make sure you contact the driver directly. So the driver is like you talking to a friend. Although we don't give you access to the direct phone numbers. Because if you give them contacts, they go backdoor and do their business backdoor, and we don't get our commission. So they communicate on the platform: "I'll be there within this time and this time". So with this information they are expectant... This communication brings trust. So you know that at what time this person is coming. Because I noticed that if you don't give the opportunity to chat amongst themselves, the driver is like: who am I going to meet? And the person is like: what time is he coming? You can leave a time range on the app, but as long as you allow them to talk... When you are just talking to someone, having a meeting, and they like that. It is very flexible. I can come as close to pick up at my home. But if we talk, we can agree that I pick up at the office. So it's very flexible and they always find their way around it. Sometimes I see the way their conversation goes, they always find their way around it. It is very nice."

F: "Okay, that is very nice to hear. Do senders often encounter privacy issues?"

J: "Yeah, so far they haven't complained about privacy issues. Because it's EU: you have to follow the privacy regulations. You have to follow them. So you can't give certain information. So they chat on the platform. I think the information will be just like taxi services, Uber. So if you ask a taxi to come to your home, they have seen your house. Like the food delivery services, where they come to your home, they have seen your house. So if you ask something to be delivered at your house, it's a general consent, just like a taxi service, delivery service. And then definitely, there are one or two people who have issues with it. But generally, I don't think there is a problem."

F: "Okay. And you mentioned before that you're also focusing on the city of Oslo. Would it be within the city that people transport something, or is it larger distances?"

J: "So with the EU project we are focusing on the city of Oslo, and how it should be framed, the dimension of the CS. Initially, we planned doing it with a business, that's IKEA. But they pulled out the last minute, because of Covid and other stuff, so they pulled out. So now, apart from Nimber being a crowdshipping platform, we have a warehouse service as well that we are running with a third party logistics provider. We are running the warehouse with them, and we are using it as a demand source. So what we are doing here is when we have a package that we have to ship to Oslo, we are trying to see if we can use a third party to do it. Okay. So if you look at the Nimber platform, we don't give insurances. We don't take responsibility of anything. What we do take responsibility of, is privacy of your data and when something happens, we give insurance, we compensate you. But with this, we have to make sure the item is delivered. So we have something called "Superbringers". These are people who have done a lot of tasks, and we have noticed that their tasks were done well. And they are people who we want to try with our system. So what we are gonna do, we are gonna have a hub...

So it's from where the warehouse is, and the city of Oslo, that's about 100 kilometres. So 30 kilometres to Oslo, we are going to have a mini-hub. So everything in Oslo, we are transporting to that place. Then we use crowdshipping from the hubs to the homes of the customers, using electric vehicles. So that's the whole idea of the pilot. So it is different from the whole crowdshipping platform. But we use the crowdshipping platform, but at last mile. So that's the idea."

F: "Okay, that is very interesting. Ehm, I have like two more questions but I see we are almost running out of time, so I was wondering: if you have a bit longer..."

J: "Yes yes, you can ask it. I just got a phone call..."

F: "Yes, if you need to take it...?"

J: "Do you have more time? I can take the call and we can continue, if that's okay with you."

F: "Yes, of course, of course!"

Recording was paused and resumes

J: "Where were we? I don't remember... Yeah, I get a lot of phone calls, a lot of stuff..."

F: "Yes, I bet. As you mentioned before, you're basically doing a lot of stuff within Nimber, so that keeps it interesting."

J: "Haha, it doesn't make it boring, at least that's good. You wake up and you're surprised every day with something new."

F: "Haha yes, I bet. Ehm, I was wondering: so you mentioned before that you were going to collaborate with another party, but they pulled out last moment. Do you collaborate with other parties or governments?"

J: "Basically, we don't. But for this EU project, we are. So we were collaborating with IKEA becasue it was a project. And with this project, we are collaborating with IKEA; with the commune of Oslo, because if you want to do something in Oslo, you need to get permission; and a logistics college, it's not in Oslo, but they are the logistics investor in Norway, so we have a collaboration."

F: "Okay, but otherwise, it's basically just you...?"

J: "Otherwise, no. If they are bringing us orders: why not? That's demand. We would do that. But otherwise, apart from that, we have no reasons for collaboration."

F: "Okay, and ehm, I was wondering, how do you market, how do you recruit the drivers for example?"

J: "Mostly social media. Social media, word of mouth, but mostly social media. We are big on Facebook. Mostly people above 25. Below 25, Instagram. So mostly social media. And I think I was told, I have forgotten this platform. But I think The Netherlands has a platform like that, where you can post everything you have, like second-hand stuff, and people buy it. So we have such service in Norway as well. So, when you go on that platform, and you select something you want to send, we have our crowdshipping platform as a delivery service. So, I think I was told, I just don't remember, but I think The Netherlands has something like that. Where they sell clothes, everything. So we also have something like that in Norway, and we have integrated our system with their system. So when, let's say, you buy a shoe, and you are about to pick a delivery, you can choose: do you want to use DHL, or whatever service, and there is also Nimber there."

F: "Yes, and I think it matches well with the products that you described before that are often crowdshipped. That is very interesting. And do you think that the marketing is important for your business?"

J: "Yes marketing is very important. Because people have to know. Marketing is very important. We don't market aggressively, but for our target market. And we also target a lot of students. Because although the money is not huge, because crowdshipping should be in such a way that the price is not the same as the traditional LSP. It should be lower. And students need money, so you can target the students, and it always works."

F: "Okay, nice."

J: "Students are mostly willing to be, what we call bringers. Those will not drive. Students are mostly willing to do that."

F: "And are there ways in which you try to keep the drivers happy?"

J: "Yes. They sometimes complain, a lot, and it's not always... Because today you might be a driver, and tomorrow you might be a sender. So it just depends on what side you are on. So we try our best to pay them on time, and yeah, we have issues with the payment service. And that is our problem. So most of the complaints we had are not about the crowdshipping concept. It is about company problems, you know. Because we are are collaborating with a payment service. So if they make a mistake, then, you know, you have to talk to the drivers. But it's just company problems, not the whole concept of CS."

F: "Okay, so they are happy with the amount of money that they get for it, and how it's done, the communication, etc., they don't complain about that?"

J: "No, because the way it is: you have to accept the task before you do it. So if you're not happy with it, you don't accept it, basically. And you see a picture. We encourage people to post a picture of their item. When a picture is not posted, then maybe... Well, I'm using myself as an example. Most often with CS, as individuals, we most often put ourselves in the shoes of the driver. Because if I want to pick up a package, and I have not seen a picture of it, and I have this kite: yes, it's gonna fit in the car, just fine. But no, I see that and I'm like: I wasn't expecting it to be *this* big. I know it could fit in a car, but yeah, maybe I wouldn't be very happy with it. But if there is a picture, I have a fair idea. Maybe I'll leave some of my things at home, maybe I'll plan well. But since you communicate, you can still ask questions: how big is it, do you think it will fit in this car? Because of communication, it is quite flexible."

F: "Okay! And, my last question would be, how often do people request a refund from the insurance?"

J: "Ooh, I would be lying if I said I had that information. I don't have that information. I'd have to ask. I have another colleague who is on customer support, but unfortunately he is on holidays. If he would be around, he would have been in the office. But he will be back next week, no, not next week, he has one more week. So after next week. Then I can get such information. But I can still ask, probably I can get it from someone else."

F: "Yes, that would be nice. And otherwise if it's a bit longer, that's also fine, because I will be working on this until July, haha."

J: "Oh, July!"

F: "Yes, I still have plenty of time. Ehm, alright, I think those were my questions. I was wondering if there is something that you think is important for me to know, or a piece of advice...?"

J: "Let's see.. I think it's best for you to understand the way the system works. So if you understand... That's why I tried to explain our whole business interaction. Because if I explain it to you, maybe your questions might already be answered. And questions you didn't think of, might come up. I have some pdf that I will send to you after the meeting, that will give you more information."

F: "Thank you."

J: "Probably might be useless, probably might be useful. Because I know in a thesis you read a lot of things, 70% useless, and very little useful things. And at the end of the day, you run out of time and you have to submit your thesis."

F: "Haha!"

J: "I'll just try and send you as concise information as possible, so you can get as much information as you can. I also have an Excel file. I will send what I think might help, then, if you look at it and you think it's good and you have more questions, we can schedule another meeting. Hopefully I don't forget that one, haha."

F: "That's very kind, thank you. And then, yes, I will transcribe everything that we said today, so that will be a fun task. Do you want me to share that with you?"

J: "Of the whole thesis, or...?"

F: "Of our meeting."

J: "No, it's okay. I have to look for the number of people who registered as businesses and not as individuals, the success rates of the whole platform, the refund, right? Yes, that would be great. I will promise to you to give you the data as fast as possible, and what I have, I can give it to you just today. I will give it to you within 15 minutes after this."

F: "Perfect. And is there anything I need to exclude from the transcript because of confidentiality or something else?"

J: "If I give it to you, then you don't have to exclude it. Then it's okay."

F: "Haha, alright! Well, thank you very much, and I'm looking forward to the documents that you'll send. And thanks again for this meeting."

J: "You're welcome. And sorry for being late again, that's not a very good first impression."

F: "No worries, I mean that happens around lunchtime, so."

J: "Enjoy the rest of your week and hopefully have a nice Easter."

F: "Yes, thank you, you too!"

J: "Alright, bye!"

C.4. Sven Mittertreiner - Municipality of The Hague

C.4.1. Additional preparation

- Do you think the role of the municipality is essential in CS?

- Why do you think pilots are important?

- What social values can be connected to CS?

C.4.2. Summary

General information about interviewee. Sven works for the Municipality of The Hague. His role is strategic policy advisor, department Mobility in the team Urban Development.

Their activities in crowdshipping. He represents the Municipality of The Hague in the LEAD project. He has the roles of spokesperson and facilitator, connecting people using the network of the municipality. Additionally, he aims to set up pilots within the municipality.

SFFs mentioned and why. *Bringing the right people together* because people should be willing to invest time, effort, and potentially resources in crowdshipping. *Pilots* are important to gain knowledge.

Additional information. He stresses that pilots are important, and this seems to be what is still missing. Also, he is not extremely knowledgeable about crowdshipping.

C.4.3. Transcript

S: "Ik zie dat de transcriptie is gestart, dus..."

F: "Ja, ik zie het. Haha, de transcriptie lijkt niet helemaal goed te gaan met het Nederlands, maar daar komen we later wel uit. Oké, ehm, ik zat te denken, misschien kunnen we beginnen met een voorstelrondje. Zal ik dan ook maar meteen beginnen? Mijn naam is dus Floor en ik ben tweedejaars student van Complex Systems Engineering. Dat is eigenlijk de master van Technische Bestuurskunde. En mijn scriptie gaat dus over crowdshipping, en daarbij kijk ik naar: wat zijn de succes- en faalfactoren van crowdshipping. Dus factoren die van belang zijn bij het van de grond komen van crowdshipping. En daarbij, welke barrières moeten overwonnen worden om dit echt van de grond te laten komen in Nederland. Daarbij kijk ik vooral naar stadsgebieden, en ik ben ook heel erg bezig met het stukje dat ik niet kijk naar ride-hailing, dus dat mensen on-demand iemand vragen of 'ie een pakketje kan bezorgen, maar echt het oorspronkelijke idee van crowdshipping: je bent toch al onderweg, dus dan kan je een pakketje meenemen. Dus dat een beetje."

S: "Leuk! Nou ja, ik ben Sven Mittertreiner, ik werk nu 5 jaar bij de afdeling Mobiliteit van team Stedelijke Ontwikkeling in de Gemeente Den Haag. Daar zit ik in het team Innovatie en Experimenten. Ik houd mij bezig met mobiliteitshubs. Even kijken, lichte elektrische voertuigen, Mobility as a Service, en een klein beetje logistiek. Het logistieke gemeente, daar doe ik eigenlijk het LEAD project voor. Daar neem ik aan deel met Rodrigo. Via hem ben je volgens mij bij mij gekomen."

F: "Ja, precies."

S: "Dus, ja, dat in het kort."

F: "Oké, en zou je misschien iets kunnen vertellen over wat jouw rol is binnen dat LEAD project?"

S: "Ja. Nou ja, in principe is het best wel simpel. De Gemeente Den Haag faciliteert, het is een van de zes Living Labs van het LEAD project. De andere zijn Lyon, Boedapest, Oslo, Porto, en, even kijken, Madrid. Ja, omdat de gemeente facilitator is ben ik gewoon de spokesperson, woordvoerder, vanuit de gemeente, naar het LEAD project toe. Daarnaast probeer ik pilots van de grond te krijgen binnen het Haagse Living Lab. En daarvoor kijk ik naar welke gemeentelijke middelen hiervoor gebruikt kunnen worden. Dus ons eerste idee was om post- en pakketstromen intern, van de gemeente zelf, te gebruiken voor een pilot. Dat zijn dan dingen waar ik dan achteraan ga. Nu zijn we bezig met het gebruiken van stadsboerderijen. Dat is natuurlijk ook allemaal van de gemeente. Om te kijken of we

daar een leuke combinatie mee kunnen maken, in combinatie met de andere partners van ons. Ja, en dat soort dingen, dan ben ik een beetje de spin in het web, om dan te kijken: welke mensen hebben we nodig binnen de gemeente, en dan wend ik mijn netwerk aan om de juiste persoon erbij te betrekken, zegmaar."

F: "Ja, ja, precies. En wat is het belang dat de gemeente heeft bij deze pilots, of bij het Living Lab in het algemeen?"

S: "Het is eigenlijk tweeledig. De eerste is eigenlijk heel simpel, duidelijk, een hoogover doelstelling: we willen gewoon een schonere stad hebben. En als er een innovatief programma zoals LEAD daaraan bij kan dragen, is dat natuurlijk meer dan welkom. In dit geval gaat het om het verminderen van pakketlogistiek. Dus minder busjes, minder dieselbusjes in de stad, minder uitstoot. Dat is het logische gevolg om een schonere stad te bewerkstelligen. En de tweede is iets dichter bij mijzelf en iets dichter bij de afdeling waarvoor ik werk, de afdeling Mobiliteit. Want wij hebben eigenlijk niet echt iemand die op logistiek zit. En dat is op zich raar voor een grote gemeente. Ten minste, we hebben wel wat mensen buiten Mobiliteit om, maar de afdeling Mobiliteit waar ik voor werk, is echt een strategische beleidsafdeling. We hebben niet echt logistiek beleid, of iemand, een beleidsmedewerker logistiek. Dus in dat kader willen we eigenlijk wel gewoon kijken, van, ja, wat speelt er in de stad. Dit is natuurlijk een wetenschappelijk project, en dat biedt ons weer kansen om als afdeling ook te leren van onszelf en van onze partners, en alle logistieke partners in de omgeving. Om ja, om te kijken van hoe de logistieke wereld eruit ziet. En of we hier iets mee moeten. Er als afdeling iemand op moeten zetten."

F: "Ja, ja, precies. Oké, interessant! En je zei net dat het vooral om duurzameheidsoverwegingen gaat dat de gemeente er heel veel in ziet. Zijn er ook andere overheden, bijvoorbeeld meer gericht op sociale waarden, of andere dingen?"

S: "Niet direct. Maar we hebben nu wel eigenlijk indirect een soort match gevonden. Dat is namelijk bij de stadsboerderij, wat ik al zei, die willen we gaan betrekken in onze pilot. En die pilot wordt eigenlijk een soort combinatie van een pakketkluis van één van onze partners, die in de buurt op het terrein van de stadsboerderij komt te staan. Een andere partner, Fietskoeriers, gaan die kluis ook gebruiken. Maar die kluis moet natuurlijk binnen staan. Maar wij zeggen: die kluis kan natuurlijk niet ín die boerderij staan. Daar wordt niemand blij van. Dus we willen het echt aan de rand van het terrein, een nieuw hokje bouwen waar die kluis dan in komt te staan. Ja, daar proberen we dan naar te kijken: is er een combinatie mee te maken met het sociale domein. Dat bijvoorbeeld het hokje wordt gebouwd door mensen uit de buurt, of mensen met een beperking. En dan proberen we op die manier ook een combinatie daarmee te maken. Maar dat is natuurlijk heel kleinschalig. Puur voor de pilot is dat interessant. Mocht het dan opgeschaald worden, dan hebben we 10 stadsboerderijen in de stad. Dan zouden we dat trucje nog wel een aantal keer kunnen doen. En daarna zou het natuurlijk wel klaar zijn qua die sociale component. Natuurlijk zijn er met crowdshipping ook allerlei combinaties te maken. Dat staat daar natuurlijk los van. Maar dat is ook wel interessant. Als daar iets mee te verzinnen valt, dan staan we daar ook voor open."

F: "Ja. Want ik kan me natuurlijk ook wel voorstellen dat het voordelen heeft voor de sociale cohesie, dat mensen waarderen dat het meer persoonlijke bezorging is dan gewoon een PostNL die langskomt, en ook dat ze misschien wat meer contact krijgen met de buren. Maar dat is nog niet een uitgangspunt dat jullie op dit moment hebben?"

S: "Nee, niet per se. Het is mooi als inderdaad dat soort bijvangsten gehaald worden. Ja. Als dat zo blijkt dat er inderdaad nog andere doelen geïdentificeerd en gehaald kunnen worden. In de eerste instantie kijken we puur naar de afdeling Mobiliteit. Dus een dichtslibbend mobiliteitssysteem in de stad, hoe gaan we daarmee om? Het LEAD project is een manier om te verkennen, om op de lange termijn te kijken: hoe gaan we minder vervoersbewegingen bewerkstelligen."

F: "Ja, oké. En ik begrijp dus dat jouw rol meer faciliterend is, dus de juiste mensen bij elkaar krijgen op elk moment. Het kan natuurlijk in theorie ook gerealiseerd worden vanuit een commercieel oogpunt. Denk jij dat de betrokkenheid van de gemeente essentieel is een voor een project als dit?"

S: "Hmmm, nee. Niet per se. Nou ja, kijk. We hebben nu natuurlijk zes Living Labs met zes grote steden in Europa. Dus in dit specifieke voorbeeld denk ik dat het wel essentieel is, want je wil natuurlijk wel dat die steden die je dan als Living Lab opwerpt, dat die dan ook daarbij betrokken zijn, en daar vanaf weten. Dat is wel normaal, netjes, ik weet niet hoe je het noemen wil. Maar ik vind het heel logisch dat de gemeente daarbij betrokken is. Maar ik denk wel dat als je zo'n soort project zou doen zonder de gemeente... Nou ja, kijk, het enige is: de openbare ruimte kun je dan sowieso niet gebruiken, of alle gemeentegronden. Maar als er een slimme connectie wordt gemaakt tussen allerlei commerciële partners, samen met de TU Delft ofzo, dan zou het volgens mij nog wel kunnen werken."

F: "Ja, dus het kán wel, maar er zitten gewoon meer hobbels op de weg dan...?"

S: "Ja, ik weet niet of ik het per se hobbels op de weg zou noemen. Want ik denk gewoon, dit project is gewoon: Den Haag wordt een Living Lab, prima. Dus de gemeente Den Haag doet mee. Het is natuurlijk ook wel heel veel makkelijker voor de verkenning naar pilots. Kijk, nu zijn we met die stadsboerderijen, dat kan niet zonder de gemeente Den Haag. We zijn ook aan het kijken naar andere mogelijkheden, zoals bouwlogistiek, waar de Gemeente Den Haag opdrachtgever is. Of grondbezitters zelfs. Ons plan om de interne poststromen van de gemeente te gebruiken, dat kan dan ook niet. Het beperkt je wel natuurlijk. Als je met alleen commerciële partners gaat werken, moeten hun business modellen gelijk zijn. In het geval van die stadsboerderijen, daar wordt van de Gemeente Den Haag verwacht dat we iets van een opstartbijdrage gaan doen. En dat kan op zich prima. Het wordt alleen moeilijker zonder de gemeente hierbij te betrekken."

F: "Ja, ja, nee snap ik. Ehm, en ik was eigenlijk ook wel benieuwd: wat zijn bepaalde problemen waar jullie tegenaan lopen? Of gaat alles van een leien dakje, haha."

S: "Nee, het gaat zeker niet van een leien dakje. Haha. Nou ja, wat ik al zei, in het begin hebben we dus ingezet op het gebruiken van interne post- en pakketlogistiek van de gemeente. Dat is eigenlijk best wel snel van tafel geveegd omdat ik intern heb uitgezocht of we dat kunnen doen, maar toen liep ik dus bij collega's en leidinggevenden direct al tegen dingen aan zoals: nouja, dit doen we allemaal met eigen mensen, en dat is allemaal zero-emissie... Dus kortom, we hebben geen behoefte aan een pilot. Dat vind ik best wel jammer natuurlijk. Ja. Ik ben er in gestapt, in dit project, met het idee van: we kunnen als gemeente ook een bijdrage leveren. En dan vind ik het best wel suf als je als gemeente niet iets, ja, mee kan doen, zegmaar. Of meedoet. Dat je alleen maar zegt: ja we zitten wel vanaf de zijlijn mee te kijken, maar zelf een bijdrage leveren, dat doen we niet. Dat vond ik jammer. Nu hebben we wel bij stadsboerderij iets gevonden wat wél van de grond lijkt te komen. Maar iets anders is bijvoorbeeld met de bouwlogistiek. Wij dachten bijvoorbeeld aan een tweeweg, een aan twee kanten benaderbare kluis te laten plaatsen, op een bouwterrein. Dus als iemand komt met kleine voorwerpen die geleverd moeten worden aan de bouwplaats, dat diegene niet helemaal de bouwplaats op hoeft, een helm op, en weet ik wat allemaal. En diegene die het gereedschap nodig heeft hoeft dan niet ineens naar beneden te komen als hij net op de 20e etage aan het werk is. Diegene kan het dan gewoon in een kluisje aan de rand van het bouwterrein droppen, een berichtje sturen naar degene die het nodig heeft, en die kan, wanneer het hem of haar uitkomt, naar beneden komen. Om dat specialistische pakketje waar hij op wacht, op te pikken. Opzich vind ik het een heel tof idee, en denk ik dat het best wel succesvol kan zijn. Maar het LEAD project duurt natuurlijk maar een paar jaartjes. En het is wel heel lastig om precies een project te vinden waar de Gemeente Den Haag opdrachtgever van is, wat ook precies in die fase zit dat je kan zeggen van oké, we doen gelijk een kluis erbij installeren. Dus het is moeilijk qua timing. Ja, en verder... Ja, dat zijn wel een beetje de belangrijkste obstakels die ik ben tegengekomen. Dus timing in het geval van bouwprojecten, en ja, eigenlijk de vastgetimmerdheid, om het maar even zo te noemen, van de gemeentelijke processen. Daar was echt geen speld tussen te krijgen. Ik heb echt allerlei manieren geprobeerd. Ik zei zelfs op een gegeven moment van joh, doe het anders in de zomer. Als onze eigen mensen op vakantie zijn, dat we het gewoon een weekje overnemen. Maar zelfs dat was not done."

F: "Ja, jammer, dat als je zo'n goed idee hebt, dat het dan niet wordt aangepakt."

S: "Ja, precies. En ik vond het vooral ook jammer dat ik zoiets heb van, ik heb het met een van de architecten van het LEAD project, Tavasszy, heb ik het besproken, voordat het überhaupt, ja, goedgekeurd was. Toen zei ik al dat het een ontzettend leuk idee is, en dat ik daar zeker graag aan mee wil werken. En als ik dan niet mijn woorden waar kan maken, vind ik dat ook wel een beetje gênant eigenlijk. Ik had zoiets van, dat lijkt me leuk, dat moeten we doen. En als puntje bij paaltje komt, dan doen we het ineens niet. Dus ja."

F: "En je zei dat de reden was dat mensen het niet wilden omdat ze het gevoel hadden dat ze al heel duurzaam bezig waren, met zero-emissie al, en dat ze het ook te veel moeite vonden...?"

S: "Ja, het werd eigenlijk meer gepresenteerd van: het is onmogelijk. We hebben hier al mensen voor, die werken bij de gemeente, met vaste contracten enzo. Dus ja, dan zou je hun werk uit handen nemen, en dan hebben zij niks meer te doen. Dus dat is een soort onmogelijkheid. En het tweede is dat als die mensen op vakantie zijn, bijvoorbeeld, dat was mijn tweede troef achter de hand, dan kan je dat gebruiken om even in te springen, zeg maar. Maar daar werd ook heel negatief op gereageerd, van: dat moeten we dan weer aanbesteden, enzo. Dat is natuurlijk een heel apart verhaal met het aanbesteden, ja... Ik vind het eigenlijk een beetje een non-argument in dit geval, omdat je... Het is iets heel kleins. En waarom zou je zoiets kleins moeten aanbesteden. Maar daar dachten collega's toch weer heel anders over. En dan ben ik maar één persoon in zo'n grote organisatie. En dan merk je ook weer dat je invloed beperkt is in dat soort gevallen."

F: "Ja, ja nee precies. En we hadden het net al gehad over bijvoorbeeld timing, en de juiste mensen bij elkaar krijgen. Zijn er nog andere factoren waarvan je zegt: dit moet goed zijn, om crowdshipping te kunnen laten werken, in een pilot of in het echt?"

S: "Hmm, nouja, crowdshipping is natuurlijk weer een ander onderwerp. Dit ging natuurlijk meer over, niet als we onze eigen post zouden gebruiken natuurlijk, dan niet, maar nu de pilot met de stadsboerderijen is niet per se crowdshipping. Het is meer het koppelen van bestaande partijen in de stad, aan elkaar, op een slimme, innovatieve manier. Ik denk dat met crowdshipping, dat je dan als gemeente niet heel veel hoeft te doen. Het is natuurlijk iets net als die flitsbezorgers, zoals Getir en Gorilla's enzo, of Flink heet het geloof ik. Nou ja, dat zijn van die dingen, daar komt de gemeente niet aan te pas. Het zijn initiatieven, die komen er gewoon. Die zijn er ineens. Ik denk dat het met crowdshipping ook zo kan werken, als iemand een heel slim platform heeft gevonden. Als Nimber bijvoorbeeld zegt, wij rollen dit uit in Nederland, of in Den Haag. Ja, ze hoeven alleen maar te zorgen dat mensen het gaan gebruiken, en dat het businessmodel voor hen zelf interessant is. Daar zijn ze natuurlijk zelf bij. En dat het voor de gebruikers ook interessant genoeg is om er gebruik van te maken."

F: "Ja, precies. Dus dan zeg je: de gemeente is dan eigenlijk niet nodig, zolang er voldoende bezorgers kunnen worden gevonden, en voldoende mensen die iets bezorgd willen hebben..."

S: "Ja, want het is met de meeste dingen natuurlijk zo... Kijk, met een gebouw neerzetten, dan heb je een vergunning nodig en dan komt de gemeente gelijk om de hoek kijken. Maar crowdshipping, het idee vind ik zo geniaal. Mensen gaan toch wel van A naar B. Of je nou op de fiets zit, of met de auto, of voor mijn part gaat lopen, als je ergens een pakketje op kunt pakken, en je neemt het mee, en je dropt het ergens anders weer af... Ja, ik denk dat het een geniaal idee is. Er is ook niks voor nodig. Er is geen extra infrastructuur voor nodig, er zijn geen gebouwen voor nodig. Alleen maar willende, meewerkende partners. Dus de plek waar je het pakketje ophaalt en afdropt, dat kan in een kluis zijn, het kan ook gewoon bij een bedrijf zijn. Je hebt natuurlijk ook in winkels PostNL punten, DHL, UPC, waar je pakketjes kan afhalen. En nu is dat gewoon verspreid. Dus ik denk dat je met dat soort winkels, zo'n zelfde soort constructie, kan je ook wel zorgen dat mensen pakketjes halen en brengen van dat soort locaties."

F: "Nee, dat denk ik ook wel inderdaad. Het moet gewoon uitgerold worden en dan komen die mensen vanzelf wel. Maar ik zat ook meer te denken aan: als jij een pakketje laat bezorgen door PostNL of DHL, dan heb je er vertrouwen in dat dat pakketje heel aan komt. En als klant kun je daar eventueel zorgen over hebben, als je dat door crowdshipping laat doen. Of anderzijds, als jij een pakketje voor

iemand meeneemt, wil je ook niet dat er rare dingen in zitten. Dus dat soort aspecten zijn dan ook belangrijk. Dus ik weet niet of dat helemaal ondervangen kan worden als er alleen een bedrijf achter zit. Stel dat dat in samenwerking is met de gemeente, dan zou je kunnen zeggen van nou ja, dan hebben mensen er misschien wat meer vertrouwen in."

S: "Ja, dat misschien wel. Maar als gemeente kun je natuurlijk geen invloed uitoefenen op wat er in een pakketje zit, en of dat goed wordt bezorgd. Dus ik denk dat dat wel... Ik weet niet of dat een argument zal zijn. Misschien als mensen zien dat de gemeente er aan meedoet, dat ze er sneller vertrouwen in hebben, maar ik weet niet of dat vertrouwen helemaal terecht is, zeg maar."

F: "Nee, wat ik bedoel is bijvoorbeeld... Er is één voorbeeld van crowdshipping dat bibliotheekboeken mee worden genomen door mensen. Of juist weer opgehaald. En dat is dan een samenwerking, het is natuurlijk niet helemaal gemeente, maar in die hoek zat ik te denken."

S: "Ja, het zou kunnen werken. Ik kan me voorstellen, als je met bibliotheekboeken werkt, dan weet je natuurlijk wat erin zit. Dat is natuurlijk sowieso al iets minder spannend dan als je zomaar een pakketje of een doos meeneemt, je weet niet wat het is, geen idee. Nou, ik zou er zelf sowieso nooit echt bang voor zijn. Ik bedoel, het is maar een pakketje. Ik ben zelf vroeger ook pakketbezorger geweest, en dan ligt je hele bus vol met pakketjes. Verder niet zo spannend natuurlijk. Die andere vind ik wel interessant, van ja, gaat dat wel goed als iemand zomaar iets meeneemt? Je weet niet of ze te vertrouwen zijn, dat zou natuurlijk wel een issue kunnen zijn. Anderzijds denk ik ook wel van ja, al die gewone bezorgers, die jouw maaltijd komen brengen... Die met 50 over een kruispunt heen scheuren, met je pizza achterin. Die komen ook elke keer weer heelhuids aan. Ik denk dat het op zich wel zou kunnen. Die angst denk ik dat een beetje ongegrond is. Ik denk dat het best wel snel overwonnen worden. Wat je nu ziet met die flitsbezorgers die zo op de fiets stappen, en pizzabezorgers die al tientallen jaren pizza's door de stad heen scheuren. Ja, dat gebeurt gewoon, en het gaat goed. Ik zou niet weten waarom het met een pakketje niet kan. Het moet zichzelf natuurlijk wel bewijzen, en het zal vast ook wel eens fout gaan. Maar ja, dat gaat met alles, alles gaat wel een keer fout."

F: "Ja, ja, oké, helder. Ehm, dit waren mijn vragen ongeveer. Ik was benieuwd of jij nog dingen had waarvan je zegt: dat wil ik je meegeven, of hier moet je nog even over nadenken."

S: "Ehm, ja, nou nee, ik heb niet echt iets specifieks in m'n hoofd op dit moment. Als me later nog wat te binnen schiet zal ik je mailen, in ieder geval. Want in hoeverre ben jij... Wie zijn jouw supervisors eigenlijk? Is dat gekoppeld aan het LEAD project, of niet per se?"

F: "Nee, verder niet. Want zij zitten aan de faculteit Civiele Techniek, en ik zit aan een andere faculteit, bij Technologie, Bestuur en Management. En eigenlijk ben ik heel toevallig tijdens mijn scriptie al bij hen terecht gekomen. Dus ik steek het ook op een iets andere manier in. Ik kijk iets meer naar, ja, de grens tussen het sociale en het beleid, die kant. Van, hoe kun je mensen zo ver krijgen om het te doen? Dus het is wel anders. Bijvoorbeeld Rodrigo is echt bezig met dat model. Zoiets komt er van mijn kant niet. Maar meer het sociale aspect daarvan."

S: "Ja, leuk, ik ben in ieder geval benieuwd naar wat je verder nog gaat produceren hierover. En ik zie je onderzoek in ieder geval graag tegemoet."

F: "Ja, zeker!"

S: "En ik zou het fijn vinden als je nog even, als je mij wil citeren, of het stukje wat wij, op basis van dit interview... Of je het nog even naar mij toe kan sturen voordat je het echt in je rapport zet."

F: "Ja, zeker."

S: "Dan kan ik kijken of er niets geks in staat."

F: "Ja, doe ik. Ik zal het morgen sturen dan. Ehm, ja. Als er nog dingen zijn die je er dan uit wil halen,

moet je het vooral even laten weten, dan komt dat helemaal goed."

S: "Ja. Ik denk dat het wel goed is hoor, maar gewoon voor mijn eigen gemoedsrust."

F: "Ja, nee snap ik helemaal."

S: "En als je verder zelf nog wat vragen of dingen hebt, schroom niet om nog een vraag te stellen als dat nog oppopt tijdens je onderzoek. Dan kan ik dat nog even verduidelijken."

F: "Super, dat is heel fijn. Oké, bedankt voor het gesprek, en dan krijg je morgen het transcript, of de transcriptie."

S: "Graag gedaan, fijne dag nog."

F: "Ja, zelfde, doei!"

D

Transcripts of focus groups

D.1. Preparations of both focus groups

0. Introduction (10 min, cumulatief 10)

   (a) Welkom

      i. bedankt dat jullie mee willen doen aan mijn focus group.
      ii. Wil graag de meeting opnemen om later in mijn scriptie te verwerken, laat het even weten als dat niet oké is.

   (b) Uitleg wat we gaan doen, wat er van hen verwacht wordt

      i. Ik doe onderzoek naar een bezorgmethode, en daar gebruik ik vooral literatuur voor. Maar nu wil ik ook mijn bevindingen valideren met échte mensen.
      ii. Wat ik van jullie graag zou willen is input, maakt niet uit of je denkt dat je de enige bent. Discussie zou leuk zijn. Ook een aantal ja/nee vragen. Kenmerk is dat het informeel is!
      iii. Ik wil eerst weten hoe jullie aankijken tegen bezorging in steden en wat jullie eigen ervaring hierbij is. Dan wil ik het onderwerp van m'n scriptie uitleggen en vragen hoe jullie hier tegenaan kijken.
      iv. Ik zal vragen stellen en de tijd in de gaten houden. Het duurt ongeveer een uurtje.

   (c) Voorstelrondje

      i. Ik zou graag willen beginnen met een kort voorstelrondje.
      ii. Naam, meest gebruikte vervoersmiddel, hoe vaak ontvang jij pakketjes per maand? (education level en age weet ik al)

1. Problem perception (10 min, cumulatief 20)

   (a) Last-mile delivery gaat over het laatste stukje van de bezorging van pakketjes, bijvoorbeeld een pakket van bol.com dat online besteld is. In mijn onderzoek focus ik mij op last-mile delivery in steden omdat veel mensen in steden wonen.

   (b) Wat zie jij als nadelen van urban last mile delivery op de maatschappij?

   (c) Ben je zelf bewust bezig met de nadelen op milieu en maatschappij?

   (d) Hoe is dit bewustzijn in de afgelopen 5 jaar veranderd?

2. Crowdshipping uitleggen met filmpje (10 min, cumulatief 30)

   (a) Filmpje laten zien (zie tekst)

   (b) In het filmpje werd kort al crowdshipping uitgelegd. Er zijn veel manieren waarop CS kan plaatsvinden, maar meestal is er sprake van een platform waarop bezorgers en klanten elkaar vinden. Op een platform plaatst de klant welk pakket bezorgd moet worden van locatie A naar B, en bezorgers kunnen hierop reageren. De bezorger krijgt hiervoor een kleine vergoeding. Er zijn grofweg drie opties voor de hoogte van de vergoeding: deze wordt door de klant bepaald, bezorgers kunnen erop bieden, of het platform stelt een vast bedrag vast. Voor mijn scriptie focus ik op crowdshipping in steden in NL.

   (c) Denk je dat crowdshipping kunnen werken in NL in steden?

        (d) Denk je dat crowdshipping een effectieve manier is om de slechte invloed van last mile delivery op het milieu te verminderen?

        (e) Denk je dat crowdshipping een effectieve manier is om andere nadelen van last mile delivery op de maatschappij te verminderen?

        (f) Zou je meedoen aan crowdshipping als klant?

        (g) Zou je meedoen aan crowdshipping als bezorger?

3. Specifiek rol als bezorger (10 min, cumulatief 40)

        (a) Wat is belangrijk in je beslissing om een pakketje voor iemand anders mee te nemen?

        (b) Stel je voor dat jij op het platform kijkt als bezorger, waar let je dan op?

        (c) Wat zijn voordelen voor jou als bezorger?

        (d) Wat zijn nadelen voor jou als bezorger?

4. Specifieke hypothetische cases (15 min, cumulatief 55)

        (a) Basis: je bent op weg van uni (studenten) of werk (werkenden) naar huis

        (b) Meerdere situaties

            i. Je hebt van tevoren kunnen communiceren met de klant over de grootte van het pakketje

            ii. Je hebt van tevoren een foto van het pakketje gezien

            iii. Je weet niks, geen communicatie of foto

        (c) Zou je dit doen? Stemmen ja/nee, daarna bespreken waarom

5. Afronden (5 min, cumulatief 60)

        (a) Bedanken

        (b) Uitleggen waar het over ging

            i. Uit literatuur blijkt dat het vinden en selecteren van bezorgers belangrijk is. Deze focus group bestaat uit studenten. Donderdag houd ik nog een meeting met mensen die full-time werken. Het verschil zit dus met name in flexibiliteit en vervoersmiddelen.

        (c) Evt. vragen beantwoorden

D.2. Transcript of video

https://www.youtube.com/watch?v=Yw2alf2gkQA

Het onderwerp dat ik wil introduceren is crowdshipping. In deze video leg ik uit wat het is. Als klant heb je veel verschillende manieren om producten te kopen. Je kunt dit bijvoorbeeld online doen of in winkels. Door globalisering zijn steeds meer producten wereldwijd beschikbaar. Uiteindelijk moet het product natuurlijk bij jou thuis terecht komen. Ook daar zijn verschillende manieren voor. Je kunt je pakketje thuis laten bezorgen met busjes of met fietsbezorging. Ook kun je kiezen voor een ophaalpunt. Een belangrijk onderdeel van deze logistiek wordt "last mile" genoemd. Dit gaat over laatste stuk vanuit het warenhuis naar de klant. Dit stuk is belangrijk omdat het veel kosten met zich meebrengt, en klanten vaak verwachten dat het de volgende dag nog wordt geleverd.

Crowdshipping biedt een oplossing hiervoor. Het idee is dat een pakketje wordt meegenomen door iemand die toevallig al een gedeelte van die reis aflegt. Bijvoorbeeld om naar het werk te gaan, of naar familie. Crowdshipping draait om twee groepen: de bezorger, die het pakketje meeneemt, en de klant, die een pakket bezorgd wil hebben. Een van de belangrijke voordelen is dat het kosten vermindert. Dit gebeurt doordat de ruimte in een voertuig efficiënter wordt benut, het grootste deel van de reis sowieso al werd afgelegd, geen extra infrastructuur nodig is, en er minder brandstofverbruik en dus uitstoot is. Maar crowdshipping geeft uitdagingen, en dat is waar ik het vandaag met jullie over wil hebben.

Focus group results

Group	Personal characteristics						Participation as courier		
	Name	Age	Education level	Main mode	Hometown population	Packages /month	Size	Picture	Nothing
Group 1, university students	Mies	16-24	MSc. student	Bicycle	370000	2	Yes	Yes	No
	Polle	16-24	MSc. student	Bicycle	120000	1	No	No	No
	Mark	16-24	MSc. student	Bicycle	100000	2	Yes	Yes	No
	Job	16-24	BSc. student	Bicycle	160000	3	Yes	Yes	No
	Saskia	16-24	BSc.	Bicycle	200000	3	No	Yes	No
	Folkert	16-24	MSc. student	Bicycle / train	100000	1 or 2	No	Yes	No
	Leon	16-24	MSc. student	Bicycle / public transport (train and bus)	370000	3	No	No	No
	Ilse	16-24	MSc. student	Bicycle / train	170000	2	No	No	No
Group 2, full-time employees	Karlijn	25-34	MSc.	Bicycle	820000	< 1	Yes	Yes	No
	Milou	25-34	MSc.	Bicycle / car	370000	12	Yes (later changed to no)	No	No
	Yael	25-34	MSc.	Car	370000	3	Yes	No	No
	Lars	16-24	MBO	Car	10000	< 1	Yes	No	No
	Femke	25-34	MSc.	Bicycle / train	370000	4	Yes	No	No
	Stephan	55-64	MSc.	Bicycle	26000	4	Yes	Yes (later changed to no)	No
	Lusi	55-64	MSc.	Bicycle	60000	1	No	No	No
	Josi	55-64	HBO	Bicycle	3500	1	No	No	No
Group 3, university students	Jonita	16-24	MSc. student	Bicycle	200000	2 or 3	Yes	Yes	No
	Iwan	16-24	MSc. student	Bicycle / train	200000	2	Yes	Yes	No
	Nick	16-24	MSc. student	Walking	200000	1	No	No	No
	Andel	16-24	MSc. student	Bicycle	200000	2 or 3	No	Yes	No
	Fenna	16-24	MSc. student	Bicycle	200000	1	Yes	Yes	No
	Esther	16-24	MSc. student	Bicycle	200000	2	Yes	Yes	No
	Micha	16-24	MSc. student	Bicycle	200000	3 or 4	Yes	No	No

Table E.1. Characteristics of focus group participants

	Focus group 1	Focus group 2	Focus group 3
What are negative societal impacts of urban last mile delivery?	• Vans stop in the middle of the road, nuisance when you want to bike past (Polle) • Vans go really fast because they are in a hurry (Ilse; Leon; Saskia), they drive recklessly (Ilse; Mark) • Engine is kept running (Folkert; Ilse) • Uncareful handling of packages (damages) (Leon) • Annoying to accept packages for neighbors (Folkert)	• Encourages increased consumption (Karlijn) • High workload for delivery drivers (Lars; Lusi; Yael) • Brick-and-mortar stores disappear, which makes shopping streets less liveable (Lusi) • Increased individualism and people living isolated (Josi) • Fights with neighbours about packages (Karlijn; Yael). However, others pointed out improved social cohesion due to contact with delivery driver and neighbours (Femke; Milou)	• The customer is bound to delivery times which cannot be chosen (Andel) • Delivery vans in city centres cause nuisance. This impacts liveability because streets become less personal and less accessible (Micha) • Delivery vans cause congestion because they stop in the middle of the road (Iwan) • Road safety decreases beccause delivery vans drive very fast (Jonita) • Delivery drivers are always in a hurry, they don't pay much attention to other traffic (Jonita) • Air pollution (Fenna)
What are negative environmental impacts of urban last mile delivery?	• Emissions (Ilse) • Engine is kept running (Folkert; Ilse) • Inefficient packaging (Saskia)	• It is very convenient to order online and to return, and many items (e.g. clothes) are burnt after returning (Karlijn) • The desired delivery method (e.g. package point) is not always an option (Stephan)	• CO2 emissions (Iwan; Nick) • Air pollution (Fenna)
What alternative delivery methods do you use?	• Package point (Mies; Saskia) • Vaults (Polle)	• Package points when available (Stephan) • Ordering with the same LSP (Milou)	• Package points (Andel)
How has awareness about negative societal impacts changed in the past 5 years?	• Convenience is very important (Folkert; Mies) • Locations of package points/vaults is important (Folkert) • Deliveries from far away (China) (Ilse) • Ordering multiple sizes (Ilse; Leon) • Returning packages (Leon) • Ordering more items to avoid delivery costs (Job) • More online orders due to covid (Mies) • Ordering is more convenient than going to the store (Folkert; Ilse; Saskia)	• More concern about the negative impacts on the environment (Josi; Karlijn; Lars; Lusi; Yael) • It is becoming too easy to order online (Karlijn; Stephan) • Only ordering products you know you will keep (Karlijn; Milou) • More online orders due to covid (Stephan) • People enjoy shopping online for fun (Josi)	• It has become too easy to order things online when you could also go to the store yourself (Micha) • More awareness of the package's origin (e.g. China) rather than awareness of the impact of LM (Fenna) • There are options to reduce CO2 impact on online orders, but I do not choose this option (Andel) • Convenience remains the most important consideration (Nick) • More online orders due to covid (Fenna) • Companies also become more aware of the CO2 impact of their deliveries (Iwan) • Documentaries help increase awareness (Jonita) • People have become more aware, but do not always translate this into actions (Micha)
Could crowdshipping work?	• In the future, cars may be banned from city centers (Mark) • No, income is insufficient incentive (Mies) • Only if the required extra effort is low (Job) • Only if there are other benefits for couriers, e.g. non-monetary (Leon) • Only in dense areas to obtain sufficient crowd (Mies) • Only if they can be consolidated (Folkert) • Only in a niche, probably with younger people (Folkert)	• No, due to trust issues (Yael) • Only in a niche (Karlijn; Lusi) • No, due to liability issues (Karlijn) • Only with a courier review system (Milou)	• Yes, the safety issues are not that significant (Micha) • Only if couriers can transport packages from hub to hub (Andel; Fenna) • Only if customers get the guarantee that their package is delivered on time (Nick) • Only if safety issues can be overcome (Nick) • Depends on if sufficient couriers can be found (Andel) • Only if centralisation is possible (Iwan) • Only if social pressure can be applied (Nick) • Only if societal awareness increases (Fenna)
Would crowdshipping be beneficial for society?	• No, due to flash deliveries (Leon) • No, due to dedicated drivers (Polle) • Yes, due to social cohesion but only if emphasised (Folkert) • No, might lead to increased volume (Mark)	• No, because it stays in a niche (Karlijn)	• Yes, improves social cohesion (Andel) • No, it might stimulate dedicated couriers (Jonita; Nick) • Depends on the social protection and rights of dedicated couriers (Micha) • Yes, due to more efficient usage of idle capacity (Micha)

	Focus group 1	Focus group 2	Focus group 3
Would crowdshipping be beneficial for the environment?	• No, due to detours (Mark) • Yes, if consolidated (Ilse) • No, might lead to increased volume (Mark)	• Yes, less emissions (Milou) • No, due to dedicated drivers (Femke) • No, due to the lack of consolidation (Stephan)	• Depends on the detours (Andel) • Depends on the modality that couriers choose (Micha; Nick) • No, it might stimulate dedicated couriers (Jonita; Nick)
Would you participate as a customer?	• Depends on the price (Folkert; Leon) • Depends on compliance (Leon; Polle) • Depends on the value of your package (Ilse; Polle) • Depends on delivery times (Leon; Mies) • You have to share private data with the courier, e.g. picture of the contents of the package (Mark) • Other privacy issues (Folkert; Saskia) • If if it possible to know the rating of the courier beforehand (Folkert)	• Yes, there is no reason not to participate (Karlijn; Milou) • Yes, because of sustainability (Josi; Lars) • Only with track-and-trace (Stephan)	• Only if the delivery time window is narrow (Fenna) • Only if the delivery time window is certain (Esther) • Yes, I think couriers can be trusted (Esther) • Only with courier reviews (Andel) • Only if couriers are checked as well (e.g. like the code the courier receives upon delivery with Flink) (Fenna) • Only for inexpensive packages (Fenna) • Only with a warranty (Esther; Nick)
Would you participate as a courier?	• Depends on pick-up locations (Folkert) • Depends on the size of your package (Ilse) • Depends on detours (Ilse) • Depends on effort (Job; Mark) • Depends on remuneration (Mark) • Only for longer trips, e.g. interurban (Folkert) • Depends on weight of package (Mies) • Depends on value of package (Ilse) • Depends on liability (Leon) • Depends on how much you trust yourself, e.g. to not forget it (Ilse) • Depends on how soon it needs to be delivered (Mies) • Depends on how much time they have during the day (Job) • Depends on how the extra income is registered tax-wise (Polle)	• Remuneration is not necessary (Milou) • Remuneration might be an incentive for others, just not for me (Stephan) • If it does not take too much effort (Milou) • If it does not take too much time (Karlijn) • Only for longer trips, e.g. interurban (Yael) • No, because it requires giving up free time (Lusi; Stephan) • Only if you can trust the customer (Milou) • Depends on size (Josi) • Depends on time of the day (Lars; Yael) • Only if the package does not contain hazardous or illegal items (Yael) • Depends on the detour (Milou) • Depends on who it is for (e.g. elderly people who urgently need medicines vs. someone who might easily pick something up themselves) (Lusi; Milou) • Depends on the weather (Josi) • Only if the app gives a push notification (Milou)	• Only if the pick-up and delivery locations are easy to find (Fenna) • No, because it requires effort (Esther) • Yes, once I work full-time (Andel) • Only if the package can certainly be delivered (Andel; Esther) • Only if the delivery location is trustworthy (Andel) • Depends on the remuneration (Iwan; Nick) • Depends on the detour compared to the original trip (Fenna) • Depends on the size of the package and my modality (Andel) • Only if your efforts are appreciated in a non-monetary ay as well (Micha) • Only if it can be made convenient (Jonita) • Only if the size and weight correspond with what has been communicated (Fenna) • Only if the package does not contain animals or hazardous items (Iwan) • Only if the package is not fragile (Jonita)
What are the benefits as courier?	• "Karma points" (Folkert; Leon) • Extra income (Folkert) • Social cohesion (Folkert; Ilse; Polle)	• Exercise (Femke) • Social cohesion (Femke; Milou)	• Remuneration (Andel; Iwan; Nick) • Contributing to a better world (Andel) • Increasing trust in the system (Micha)
What are the disadvantages as courier?	• Extra effort (Job)	• Customer might not be home (Karlijn) • Much effort to constantly look at the app (Milou) • You are inflexible because you have committed to a certain plan (Karlijn)	• Customer might not be home (Nick) • Extra time (Andel; Fenna; Nick) • Extra effort (Fenna; Micha) • Liability issues (Esther) • Paper work (Micha) • When driving, detours cause extra fuel costs (Nick) • Restriction of flexibility (Andel; Iwan; Nick)

Table E.2. Answers to the open question per focus group