

# Incorporating Success and Failure Factors in Enhancing the Last Mile Delivery System of (Online) Grocery Retailers

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by

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## Preface

Dear reader,

Here lies in front of you my master thesis “Incorporating Success and Failure Factors in Enhancing the Last Mile Delivery System of (Online) Grocery Retailers”. It has been written to fulfill the final requirements for my master’s degree Complex Systems Engineering and Management. This thesis was undertaken at the Accenture Strategy practice during a six-month internship from September 2019 to February 2020. By developing a new framework that incorporates success and failure factors in a multi-actor multi-criteria analysis, this thesis aims to create a point of view of the last mile delivery of online groceries in the Netherlands for academics (from the Delft University of Technology), Accenture Strategy practice and (potential) practitioners of the system.

After completing all the academic courses for both my bachelor’s and master’s degree in systems engineering and management, I was eager to bring my knowledge into practice. Therefore, I want to thank Rohit Bhat for hiring me as an intern to write my thesis at the Value Office of the Accenture Strategy practice. Given my transport and logistics background, Rohit Bhat asked me to do research on the last mile delivery of online groceries. After doing some initial research on this topic, I became excited to tackle one of the most challenging problems of online groceries. Looking for a suitable approach, I was reminded of the master’s course “Innovations in Transport and Logistics”, that taught me to analyze success and failure factors of either a transport or a logistic system with a self-developed framework. The results were very interesting. However, it bothered me that it did not contribute to solving real-life problems by proposing and evaluating solutions based on these analyses. Therefore, I decided to develop a framework that could bridge this practical gap and that by doing so be the first one to bring it into practice by applying it on the last mile delivery system of (online) grocery retailers. I felt honored that both academics and practitioners acknowledged the added academic and practical value of my research on the last mile delivery of online groceries and the approach I have developed.

There are many people that I would like to thank that have either contributed to the content and quality of this thesis or that have supported me during this last phase of my master program. First, I want to thank my committee. I will always remember my first supervisor, Ron van Duin, as a very enthusiastic person who has been very helpful, kind and critical throughout my whole thesis. He helped me from the very beginning in forming a committee, until the very end of making sure that I took the right procedures for graduating. I thank him the most for providing me critical feedback and areas for research related to last mile delivery of online groceries that have helped me to write a complete and strong thesis. My second supervisor, Bert Enserink, stands out for his positive energy and his open character. During every meeting or call, he was the person who gave me the confidence that the work I provided was on the level I wanted it to be. Besides, he also provided me great guidance in using multi-actor and multi-criteria analysis methods. The chairman of my thesis was Bert van Wee, who has managed every meeting in an outstanding way. Besides, he always responded very quickly to my messages and provided very useful detailed and critical feedback during every meeting. His guidance in both developing and reflecting on frameworks related to success and failure factors has helped me to enhance the academic value of my thesis. The last member of my committee is Rohit Bhat, who besides hiring me as an intern at the Value Office of the Accenture Strategy practice, also provided me help at every stage of my thesis. Rohit has been one of the kindest persons I have ever met that despite his busy schedule, always helped me when I wanted to discuss something with him or when I felt stuck. His unbelievable knowledge on strategic thinking and topics related to last mile delivery of online groceries always provided me a different perspective that made me critically rethink my work

and the direction I was taking. All four committee members have helped me to step up my game and have driven me to write a strong thesis.

Secondly, I want to thank all the experts, researchers and stakeholders that took time for having an interview with me. Besides the busy schedules of stakeholders, I have also faced the problem that many people did not want to (partly) help me due to confidential information. Without the interviews, it was not possible to collect all the data that were needed for this thesis. Therefore, I am very thankful for the ones that did help me in an ethical way. I want to give a special thanks to the bricks-and-clicks grocery retailer and the independent researcher who helped me to score all the collected data, since this took a lot of time. Besides, I also want to thank everyone who has helped me to arrange these interviews.

Thirdly, I would like to thank Frans de Groot and Casper Rietdijk for arranging a trip with Frans during his workday of delivering online groceries that allowed me to do an empirical research on the last mile delivery. Besides the usefulness for my thesis, it was one of the most fun and memorable parts of my thesis. I also want to thank all the employees at the hub and customers that day for giving me a really good experience. Special thanks to Rohit Bhat who “forced” me to do this.

Fourthly, special thanks to people from the Accenture Strategy practice for all the coffee breaks, Monday morning meetings to talk about our weekends, walks “to enhance my productivity”, lunches, (Friday) drinks and events together: Alonso, Bar, Carlo, Friso, Magnus, Reşalt, Robert, (once more) Rohit and Philippa. Thanks for giving me a very happy and memorable time at Accenture. Besides the fact that I have been very busy with my thesis, I cherish every moment with you. I also want to thank Alonso, Bar, Reşalt, Robert, Rohit and Philippa for joining the brainstorm session and providing useful solutions for my thesis.

Finally, I want to thank my study mates, friends, family, colleagues, girlfriend and all the persons who gave me a lot of love and support during my thesis. I want to thank you all for creating the most optimal environment for writing my thesis and to help me whenever I needed it. Special thanks to Donald Janssen and Timothee Macquart for reading my thesis and providing me with feedback before submitting my final version. I am very proud of my thesis and I hope you will enjoy reading it!

*Melvin Yip  
Amsterdam  
March 2, 2020*

## Summary

The (expected) rise of the online grocery shopping market has led to more competition and complexities in the Dutch grocery retail landscape. This market consists of the traditional grocery retailers with physical stores that added an online channel (the so-called bricks-and-clicks grocery retailers) such as Albert Heijn and Jumbo, and the grocery retailers that only provide an online channel (the pure players) such as Picnic. Besides these two stakeholder groups, other markets and parties that influence, such as providers of last mile delivery services, or markets and parties that get influenced by this service innovation such as governments and the market of meal boxes, are also involved. A lot of controversy among academics and practitioners exist, about the viability of online grocery shopping due to the cost-effectiveness in the last mile of the supply chain (delivery from the warehouses or stores to the customers) as there is high difficulty in combining this with a high consumer service level. Given the different objectives that must be achieved for a successful last mile delivery of online groceries, factors can be identified that either has led to a successful achievement of the objectives (success factors) or factors that formed a barrier to achieve these objectives (failure factors). However, no research has been focused on these success and failure factors of the last mile delivery of online grocery shopping in the Netherlands and to what extent these are important for proposing innovative solutions to enhance the viability of this service innovation. Therefore, the aim of this thesis was *to identify the success and failure factors from the perspective of different stakeholders of the last mile delivery of online groceries in order to enhance their viability in the Netherlands.*

However, no framework or method was found in the scientific literature that could aid answering the research question “*What are the success and failure factors in last mile delivery of online groceries that are relevant for analyzing and evaluating the viability of online grocery shopping for different stakeholders in the Netherlands?*”. Therefore, a new approach called the Multi-Actor Multi-Success-and-Failure Factors Multi-Criteria Analysis (MAMSFFMCA) has been developed and successfully applied. This method provides a structured way of proposing and evaluating innovative solutions based on the identified objectives, success and failure factors from the perspective of different key stakeholders. The MAMSFFMCA consists of seven steps:

1. Stakeholder identification
2. Stakeholder objectives identification
3. Success and Failure Factors (SFF) identification
4. Means exploration and alternatives identification
5. Weight the objectives and SFF's
6. Scoring alternatives against weighted objectives/SFF's
7. Sensitivity analysis and stakeholder implications

For applying the MAMSFFMCA, several approaches and methods were used. 16 experts and stakeholders were interviewed for determining the key stakeholders for the viability of online grocery shopping in the Netherlands. Besides, during these semi-structured interviews also the stakeholders' objectives, associated success and failure factors, and an initial list of alternatives were elicited. For analyzing the success and failure factors, no academic framework has been found to be applicable. Therefore, a framework has been developed after consulting the expertise of an Accenture expert on the categories. This SFF framework has been very useful for analyzing the success and failure factors. Next to the initial list of solutions from the interviews, a brainstorm session within the Value Office team of Accenture (6 participants) was organized to gather another set of solutions. The third set of solutions was designed by the researcher given the knowledge elicited from the empirical research, the interviews and the research on secondary resources. After this, an independent researcher and a

bricks-and-clicks grocery retailer were given a survey to weight the selected objectives and SFF's. Besides, they were also asked to score the alternatives elicited from the interviews, the brainstorm session and the researcher's expertise, on the SFF's. From this, the best scoring solutions were scored on the stakeholders' objectives. All the weightings and scores were based on a 5-point Likert Scale.

From this approach, objectives of the key stakeholders have been identified, success and failure factors of the last mile delivery of online groceries have been analyzed, and solutions on these crucial factors have been proposed and evaluated. This has led to recommendations for both practitioners of the online grocery shopping systems as for academics.

Firstly, the objectives of the following key stakeholders are identified based on interviews with experts and stakeholders: grocery retailers, customers, government and deliverers. The most important objectives for grocery retailers are low costs, good image, high punctuality, high profitability and a high rate of complete orders. The most important objectives for customers are low costs and more ease. For government, low CO<sub>2</sub> emissions is the most important objective, followed by low noise for citizens. Deliverers mainly want to have high comfort. However, some objectives were overlapping e.g. customers, deliverers and grocery retailers all prefer a punctual delivery. Therefore, all the stakeholders are represented with at least several objectives. To these stakeholder specific objectives, a bricks-and-clicks grocery retailer and an independent researcher assigned scores to determine the importance of the objectives for the viability of online grocery shopping. The bricks-and-clicks grocery retailer usually use KPI's that are only related to their own objectives for achieving a viable last mile delivery. This has been validated by the scores that the grocery retailer has assigned to the objectives. Thus, by involving these objectives in the evaluation process, more insights can be created, than by only using the grocery retailers' KPI's. However, this method of assigning scores on a 5-point Likert Scale, does not reveal the rankings among these important objectives. This would have added more reliable information on the preferences of the interviewees.

Secondly, the crucial success and failure factors for a viable last mile delivery of online groceries system have been identified and analyzed. These success and failure factors are related to four main challenges. The main challenges are making the last mile delivery more efficient and sustainable both to the addresses as at the customers' place, to attract more customers and to keep them satisfied by providing a high customer service level. This will enhance companies' profitability. According to the brick-and-clicks grocery retailer, the most important challenge for the viability is to deliver as efficient and sustainable possible to the (new) addresses of customers. Related success and failure factors that were rated as important are the lack of data of the (new) addresses, the lack of accurate routing time information, the lack of experienced drivers and the barriers related to the adoption of electric vehicles e.g. lock-in of current fleet. At a more operational level, deliverers can be more efficient at the customer's place, mostly due to better trainings or evaluations e.g. in driving performance or being more customer friendly. In order to provide a better customer service level, the communication of the deliverers and customers about the arrival time must be enhanced. Besides, customer will be kept satisfied if they will get ideal time slot offered and the opportunity to order all the preferred groceries or substitutes. In order to build scale, a solution must be found for customers that prefer to do groceries in the (mostly nearby) physical stores and that they do not like to do groceries in advance, because they usually do not know what to eat.

Thirdly, for all these crucial success and failure factors, solutions have been proposed and evaluated. However, the evaluation was only based on two interviews (one with an independent researcher with customer perspectives and one with a bricks-and-clicks grocery retailer), which has led to a low representativeness and reliability of the solutions. However, the results can be used as indication for

the potential of the solutions as it has the support of an independent researcher and a grocery retailer. For attracting more customers, it is very important to help the customers to build a new habit of switching from doing groceries in the physical stores to do online grocery shopping. For this, flexible subscriptions which can easily be terminated might work. Another way to attract more customers is to offer same day delivery for people who do not know what to eat at locations where a lot of people work or come together. Besides the fact that this will lead to more scale and thus more efficiency for the grocery retailers, this will also provide ease for customers. However, a solution with the highest potential (highest score on stakeholders' objectives) is the 'Amazon boxes for 'not at home' delivery including cool boxes'. This solution allows deliverers to deliver the online groceries in boxes outside customers' houses. Besides, this solution scored the best on all the objectives of the grocery retailers, customers, governments and deliverers, since it will lead to a very efficient last mile delivery that provides ease to all the parties. Due to the efficient delivery, these solutions will enable the collaboration with governments, delivery companies and other e-commerce companies. This might lead to more sustainable deliveries with electric vehicles. For the crucial factors that have made the last mile delivery less efficient like the lack of data of the addresses and real-time routing information, the lack of communication between deliverers and customers about the arrival times, and the lack of experienced well-trained deliverers, better planning and routing algorithms and software should be used. Also, better use of the Customer Relation Management (CRM) systems or other technologies e.g. smart packaging, is recommended to provide better communication between customers and delivers, and to enable better evaluations and trainings for deliverers. These systems and technologies can capture customer's information to make the whole process of online grocery shopping more efficient and tailor-made.

Recommendations for practical use are related to the identified success and failure factors, the most potential solutions and the MAMSFFMCA methodology. First, this thesis identified many success and failure factors, that can be used by both established grocery retailers as start-ups as a checklist to evaluate their online grocery shopping system and to enhance its viability. Second, many solutions have been proposed that might help grocery retailers innovate their online grocery systems. Important next steps for the identified solutions are to do a feasibility analysis and to develop the feasible solutions with the stakeholders. For example, the Amazon boxes for 'not at home' delivery including cool boxes, is a good solution for achieving an efficient and sustainable last mile delivery. However, it is also necessary to do research on the financial, political, environmental and social feasibility of this solution. This solution might for example not be feasible due to too high costs. Last, the MAMSFFMCA method has proved to be a very practical and structured method to engage stakeholders for identifying success and failure factors and to propose and evaluate solutions. This method can be used by all practitioners for finding and evaluating suitable solutions in order to reach certain objectives. Besides, it enables focused discussions and might therefore be an ideal tool for supporting decision-making. The MAMSFFMCA stands out in three aspects compared to the Multi-Actor Multi-Criteria Analysis (MAMCA) by Macharis (2007) and other Multi-Criteria analysis (MCA) methods: 1. it offers structured guidelines for identifying effective solutions that tackle the most important success and failure factors, whereas it remains quite vague how to identify solutions in the MAMCA or other MCA methods 2. it not only evaluates the solutions on objectives as in the MAMCA and MCA, but also on the most crucial success and failure factors for a viable system, and 3. the MAMSFFMCA also allows the stakeholders and experts to have an effective discussion on the best solutions for every success and failure factor, whereas the MAMCA and MCA only allows to compare the solutions based on the scores on the objectives. However, the main limitation is that it involves more steps than the MAMCA and MCA, which means that the MAMSFFMCA is more time consuming.

Recommendations for academic research are focused on further developing the MAMSFFMCA method due to the lack of applications and expertise, and to do more research on the online grocery shopping in the Netherlands, since this thesis mainly provided a broad point of view of the current system. For developing the MAMSFFMCA method, more guidelines and rule of thumbs must be formulated that can be used for the data gathering, the selection procedures and the evaluations of every step. For this, extensive literature research on each step of the MAMSFFMCA should be conducted or experts in the field of evaluation tools or the adoption of innovations should be involved. One of the steps that could be improved is the weighting of the success and failure factors and the solutions. A mixed method of multi-criteria analysis techniques such as Analytical Hierarchy Process (AHP) and the Preference Ranking Organisation MeTHod for Enrichment Evaluations (PROMETHEE) might be a good method for weighting, since Macharis et al. (2004) propose this method for the MAMCA. Also, the pairwise comparison method Best Worst Method (BWM) could be used for a certain ranking among the objectives (Rezaei, 2015a and Rezaei, 2015b). Compared to AHP, the BWM stands out for its simplicity and reliability by only using two vectors of pairwise comparisons (Rezaei, 2015a). Besides, a way to enhance the robustness of the solutions is to use scenario analyses for the sensitivity analyses (Hickman, et al., 2012). Due to time constraints this was not applied for this thesis, since the main limitation of the MAMSFFMCA is that it is very time consuming due to the added steps of identifying, analyzing and evaluating the success and failure factors compared with the MAMCA. Thus, this should be applied in other researches that have more time than was provided for this thesis (25 weeks). This also means that the MAMSFFMCA method should be applied in other fields as well, which can offer an opportunity to test the different guidelines and rule of thumbs. This will also enhance the experience of using the method. For enhancing the reliability of the results on the viability of online grocery shopping in the Netherlands, more and better interviews should be conducted since it was difficult to reach out to the most knowledgeable and important stakeholders due to time constraints, lack of willingness to share confidential information and network limitations. For enhancing the list of failure factors, former companies like Stockon should be involved. For enhancing the list of success factors, representatives from successful grocery retailers should be interviewed that have an important function e.g. Picnic, that knows all the strategies. It is also important to involve more customers and representatives from other areas than the "Randstad". Lastly, the evaluations of the proposed solutions should be done with more objective quantified data, instead of interviews in order to have reliable evaluations.

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## List of abbreviation

AE	-	Accenture expert
AHP	-	Analytical Hierarchy Process
AIS	-	Account Information Services
CS	-	(Governmental) civil servants
CPAE	-	Customer perspectives represented by Accenture experts
CPIR	-	Customer perspectives represented by independent researcher
CRM	-	Customer Relationship Management
CSAB	-	Content Selection and Advisory Board
DMR	-	Direct Matrix Ranking
DC	-	Delivery companies (that provide the last mile delivery)
E-grocery	-	Online grocery shopping
GR	-	Grocery retailers (are bricks-and-clicks companies and pure players that are responsible for online grocery shopping activities)
HR	-	Human Resources
IR	-	Independent researchers
IT	-	Information Technology
KPI	-	Key Performance Indicator
MCA	-	Multi-Criteria Analysis
MAMCA	-	Multi-Actor Multi-Criteria Analysis
MAMSFFMCA	-	Multi-Actor Multi-Success-and-Failure-Factors Multi-Criteria Analysis
MSc CoSEM	-	Master of Science Complex Systems Engineering and Management
OE	-	Operational employees
PIS	-	Payment Initiation Services
PROMETHEE	-	Preference Ranking Organisation MeTHod for Enrichment Evaluations
SFF	-	Success and Failure Factors
TAM	-	Technology Acceptance Model
TPB	-	Theory of Planned Behavior
WCS	-	Weighted Sum Score

## 1. Introduction

The emergence of the e-commerce (emarketer, 2019) has led to a boom in online grocery shopping (also referred as e-grocery), that increased competitiveness and complexity within grocery retailing (Hand et al., 2009). The worldwide online grocery shopping market value doubled between 2017 and 2018 from 13 billion U.S. dollars to a total amount of 26 billion U.S. dollars in 2018 and this amount will grow even more (Business Insider Intelligence, 2019). In 2017, 29 percent of the total Dutch citizens have been doing online grocery shopping. This made them frontrunner of Europe for online grocery shopping (CBS, 2018). In the Netherlands, experts expect the market share of online groceries in e-commerce to grow from 4 percent in 2018 to 13 percent in 2023, while consumers even expect this growth to be up to 22 percent by 2023 (Ecommerce News, 2018). Given the current position and the potential development, the Netherlands is an interesting focus area of research for online grocery shopping.

This sales opportunity in the grocery retail has led to many changes in the grocery retail landscape. Nowadays, many traditional grocery retailers with physical stores have added an online channel to exploit the online grocery market (Agatz et al., 2008). These companies are called the 'bricks-and-clicks' companies. Besides, the so-called 'pure players' have also infiltrated the market by only providing an online channel to reach customers from their distribution centers or hubs by collaborating with traditional grocery retailers (Agatz et al., 2008). Many pure players believe that the emergence of e-commerce offer an opportunity to introduce a new business and brand to innovative customers by having efficiency advantages e.g. low overhead and good prices (Min & Wolfinbarger, 2005). On the other side, Laudon & Traver (2007) suggest that brick-and-clicks companies might have more advantages e.g. strong brand name, established distribution centers, a customer base and distribution network. By offering the opportunity to do online groceries, both type companies can anticipate the changes in the shopping behavior and the socio-demographic characteristics of customers (Leeflang & Van Raaij, 1995).

Within this new online grocery landscape, both bricks-and-clicks and pure-play companies face many challenges. According to McDonald et al. (2014), online grocery shopping is known for being the Bermuda Triangle of e-commerce, which is a place where investments will go in, but will never return in profit. This name is given due to the failure of early online grocers in the United States such as Webvan and HomeGrocer. It is also suggested that there are barely success cases (Grunert and Ramus, 2005). Since the 1990s, both academics and practitioners have been controversial about the viability of online grocery shopping, since some predicted online grocery shopping to become the biggest online market, while others did not believe the business could succeed (Anckear, et al., 2002). According to Punakivi et al. (2001), it is very challenging to combine companies' profitability and a high consumer service level. Especially the cost-effectiveness in the last mile of the supply chain (delivery from the warehouses to the customers), has become the biggest challenge for bricks-and-clicks and pure player grocery retailers (Punakivi et al., 2001). According to researches by Amit & Zott (2011), Rappa (2004) and Bouwman & MacInnes (2006), scalability is the key factor for the success of an efficient last mile delivery of these internet-based business models. Besides, online grocery shopping face fluctuating natural conditions, different product flows from different suppliers and variety in quality and quantity, which requires complex dependencies among the actors in the supply chain of e-groceries (Frederiksson & Liljestrang, 2015). These dependencies also impact the efficiency of the last mile delivery of the online groceries e.g. customer's non-attendance due to traffic (congestion) that causes a delay delivery or a delay arrival of the customer (Pan et al., 2007). In addition, the last mile delivery of groceries also includes the traditional societal last mile challenges such as increasing number of

vehicle movements, which is associated with more congestion, more noise in the urban areas, more pollution and worse traffic safety level (Quak & Van Duin, 2010).

Many researches have discussed these company, consumer, and societal related challenges that affect the viability of online grocery shopping around the globe (See chapter 2, section 2.2). Several knowledge gaps have been identified. First, no recent research has focused on the success (and the possible failure) of online grocery shopping in the Netherlands. It is important to understand what factors lead to a successful adoption of online grocery shopping in the Netherlands and which factors are still faced by the consumers, governments, bricks-and-clicks and pure player companies that hinders the adoption. Besides, it is also important to determine to what extent these success and failure factors are important for the viability of the online grocery shopping innovation. Second, no comprehensive research has used insights on success and failure factors of the last mile delivery of online groceries to enhance the viability of this innovation. By engaging stakeholders in the decision-making process, better insights into the issues that affect the stakeholders could be gained and thus will lead to an easier adoption of the innovation (Vindrola-Padros, et al., 2017). Therefore, the aim of this thesis is *to identify the success and failure factors from the perspective of different stakeholders of the last mile delivery of online groceries in order to enhance their viability in the Netherlands.*

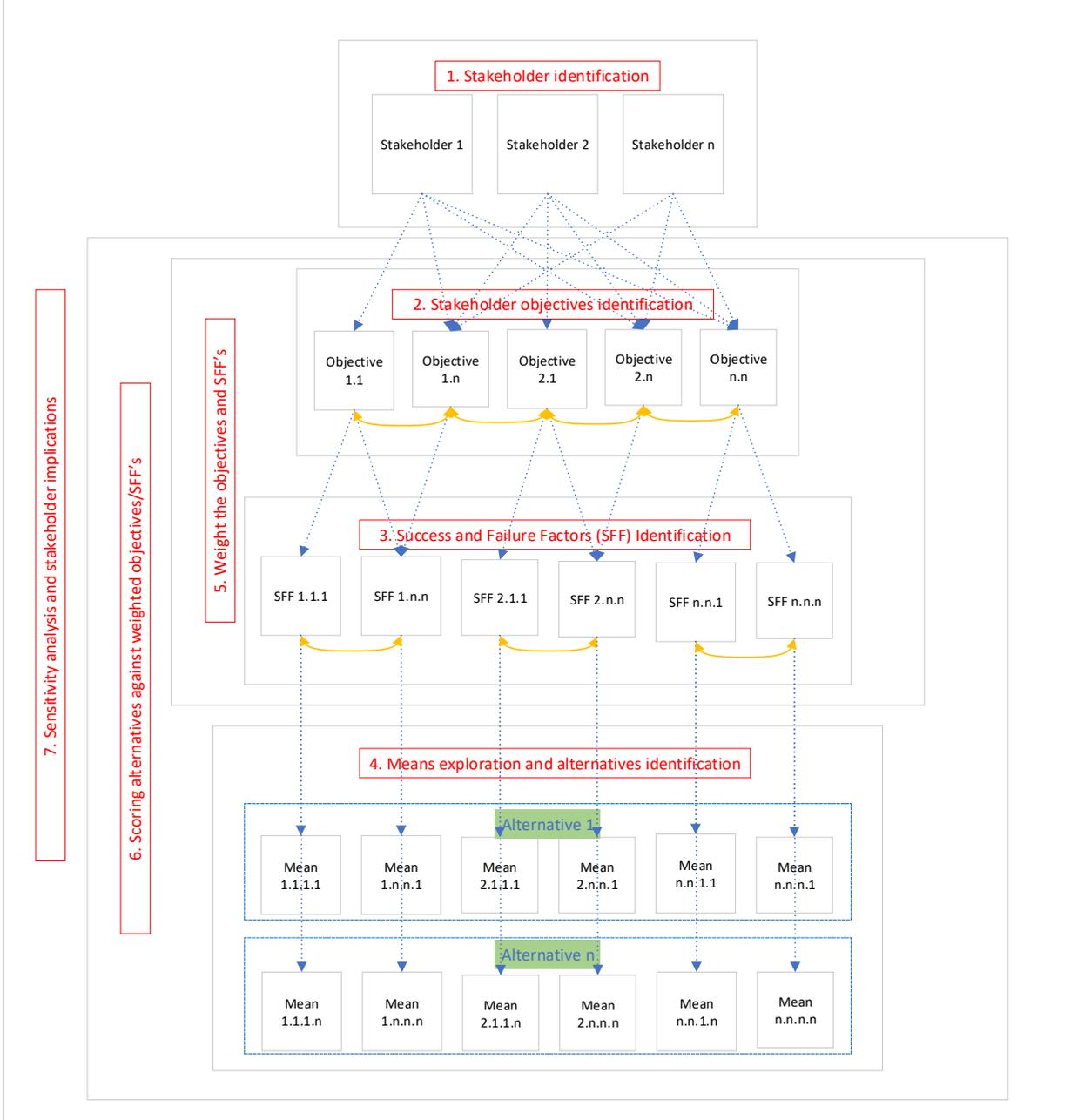
For this, research on the success and failure factors requires a multi-stakeholder perspective which allows for the design of a solution that enhances the viability of online grocery shopping. This leads to the third knowledge gap that has been identified, which is the absence of a framework or methodology that bridges the understanding of success and failure factors with the application of these crucial factors for determining and evaluating solutions (See chapter 2, section 2.1). Therefore, a new approach called the Multi-Actor Multi-Success-and-Failure-Factors Multi-Criteria Analysis (MAMSFFMCA) (See figure 1) was applied in this research. This approach uses success and failure factors to find innovative solutions and evaluate these by conducting a Multi-Actor Multi-Criteria Analysis (MAMCA) (Macharis, 2007). Since multi-criteria analyses are only evaluation tools for proposed solutions, the literature must also be reviewed to find a suitable approach to analyze and evaluate the success and failure factors (Gerçek, et al., 2004). These success and failure factors determine what is (un)desirable for the viability of online grocery shopping in the Netherlands. Given these success and failure factors, the MAMSFFMCA method allows a structured way of proposing innovative alternatives, as opposed to the traditional MAMCA (Macharis, 2007). This approach helps answering the following main research question:

*What are the success and failure factors in last mile delivery of online groceries that are relevant for analyzing and evaluating the viability of online grocery shopping for different stakeholders in the Netherlands?*

For answering the main research question, several sub questions are formulated:

1. What suitable frameworks can be found in literature for analyzing and evaluating the success and failure factors of the online grocery delivery models?
2. What are the roles and objectives of various last mile delivery stakeholders in the viability of online grocery shopping in the Netherlands?
3. What are the most important success and failure factors of the current Dutch last mile delivery concepts of online groceries from the perspectives of different stakeholders?
4. How can the insights from the success and failure factors enhance the viability of online grocery shopping in the Netherlands from different stakeholder perspectives?

This thesis provides a scientific contribution as well as a societal contribution. The former is done by filling the three identified knowledge gaps. The latter by providing Dutch grocery retailers (or others) with an overview of challenges and opportunities – e.g. suggestions for more effective strategies. Within these suggested strategies, the government can find its role of solving societal issues. Lastly, this research offers both consumers and operational workers of the last mile delivery an opportunity to be part of the decision-making process, which leads to a unique insight of the issues that they are currently facing in the Netherlands.



**Figure 1.** Integrated Framework of Success and Failure Factors with Multi-Actor Multi-Criteria Analysis

In the second chapter, a literature review was performed in order to create an overview of the current academic researches on the last mile delivery of online groceries. In this chapter, the identified knowledge gaps for this research are made explicit. In the third chapter, the research method

MAMSFFMCA is elaborated. The MAMSFFMCA provides a structured way for answering the research questions. This chapter also focusses on linking the research methodologies to the MSc CoSEM program. The results of the MAMSFFMCA are presented in chapter four till six. Chapter four is devoted to answer sub question two. The chapter gives an overview of the online grocery shopping market in the Netherlands and the stakeholders. Chapter five presents the success and failure factors of the current last mile delivery concepts of online groceries in the Netherlands. In chapter six, alternatives that enhances the viability of online grocery shopping in the Netherlands are given that are based on the success and failure factors. In the same chapter, the alternatives are scored whereas a sensitivity analysis is performed. This has led to certain stakeholder implications. These are presented in chapter seven. Lastly, the eighth chapter provides conclusions for each sub question that leads to answering the main research question. In addition, discussions of the MAMSFFMCA and the implications on the results are given, followed by suggestions for future research.

## 2. Theoretical Background and Literature Review

Since there has been a lot of controversy about the viability of online grocery shopping, this thesis finds its contribution to the academic literature in identifying the key factors that determines the success and failure of online grocery shopping from different stakeholder perspectives and, as opposed to some other practitioners and academics, using it to enhance the viability (Anckear, et al., 2002). Therefore, this chapter has two purposes. First, a suitable framework for analyzing and evaluating success and failure factors from different stakeholder perspectives must be found. This helps answering the first sub question: “What suitable frameworks can be found in literature for analyzing and evaluating the success and failure factors of the online grocery delivery models?” For this, the background of frameworks for success and failure factors that influences the adoption of innovations are elaborated on in section 2.1. Second, the added value of this thesis to academic research that concerns the last mile delivery of online grocery shopping must be elaborated on. For this, a review of the literatures related to the last mile delivery of online groceries is performed in section 2.2. This review provides an overview on the approaches or frameworks that are used, the key factors per category of economic, social, technical and political challenges and the involved stakeholders. From this, it can be concluded that (1) no research has been focused on the success and failures of online grocery shopping and the issues of the stakeholders involved in the Netherlands, (2) no comprehensive research exist that used these key factors to enhance the viability of online grocery shopping and (3) no framework or evaluation method exist that uses the analysis of success and failure factors for determining and evaluating solutions for enhancing the viability of online grocery shopping.

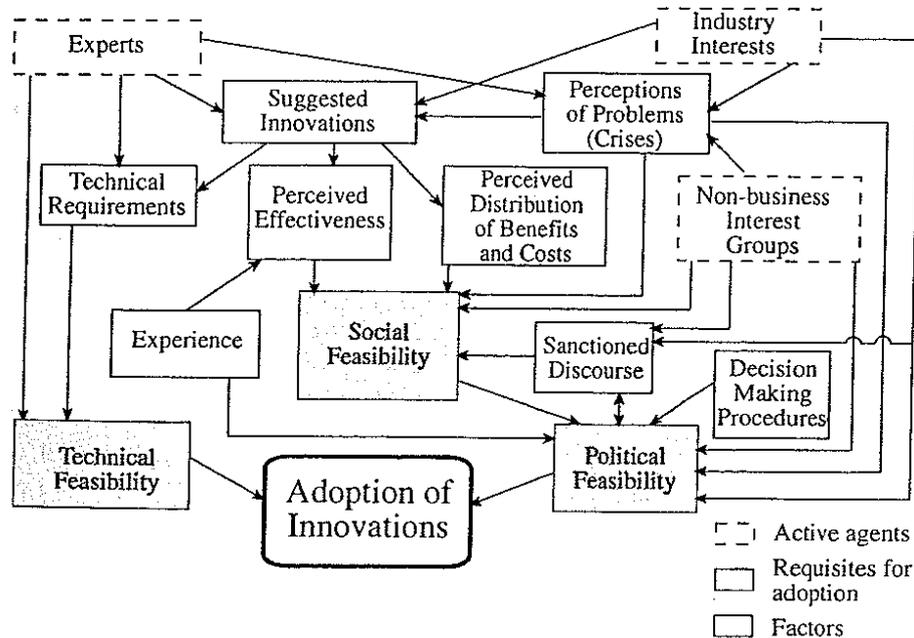
### 2.1 Background of Success and Failure Frameworks for the Adoption of Innovations

It is important to understand that innovation doesn't necessary mean that something must be invented or that a new design must be made. Innovation is mainly about the clever application of ideas or existing inventions that create an added value for a company, an organization or a society (van Leeuwen, 2006). According to Alba et al. (1997), online grocery shopping is a new way of grocery shopping that can be considered as a service innovation. Some innovations are adopted, while others are not. The success or failure of the adoption of innovations are affected by certain factors (Feitelson & Salomon, 2004). This raises the question: What is meant with a successful adoption of an innovation? Traditionally, an innovation is a success if it has reached a certain financial return (Cooper & Kleinschmidt, 1987). However, according to Maidique & Zirger (1985), it depends on the objectives a certain actor wants to achieve, since the introduction of an innovation might lead to limited financial return but can still be considered as a success. For example, if the innovation has a major impact on the market or if it has opened an opportunity window without having a financial return (Cooper & Kleinschmidt, 1987). Thus, the measurement of the success of a last mile grocery delivery system depends on the objectives of the different stakeholders in the system. Therefore, the different stakeholders must be engaged, and their objectives must be involved in the decision-making process in order to determine to what extent the last mile grocery delivery system is a success.

For evaluating the factors that affects the adoption of online groceries, several frameworks have been used (Verhoef & Langerak, 2001; Kang et al., 2016; Kurnia & Chien, 2003; Alam et al., 2016). Verhoef & Langerak (2001) and Kang et al. (2016) developed an own research model based on literature reviews regarding online grocery shopping. On the other hand, Kurnia & Chien (2003) applied the Technology Acceptance Model (TAM) and Alam et al. (2016) used the Theory of Planned Behavior (TPB) which are both frameworks for exploring determinants of technology acceptance and adoption focusing on the link between attitude and behavior. However, both the frameworks and the developed frameworks

only focused on the determinants of consumers' adoption, which thus excludes other stakeholders (e.g. grocery retailers, delivers and governments) in the analysis.

The Political Economy Framework of Feitelson & Salomon (2004) is a more suitable framework for analyzing the success and failure factors for the adoption of innovations (See figure 2).



**Figure 2.** Framework for analyzing success and failure factors. Adapted from Feitelson & Salomon (2004)

According to Feitelson & Salomon (2004), the success and failure factors are related to the economic, technical, social and political feasibility. They argue that innovations are the result of entrepreneurship in which two groups can essentially enhance innovations. The first group is the industry that is driven by enhancing its profitability or productivity and thus keeps investing in innovations. The second group consists of experts and professionals that enhance innovations in which they believe. These are thus key players to involve in this research. However, it remains unknown what the applicability of this framework is for this research topic.

Therefore, in section 2.2, a literature review about the last mile delivery of online groceries is performed in order to find out three things:

1. What frameworks and approaches have been applied in this field?
2. What stakeholders are focused on with the used framework or approach?
3. What are the key factors related to the economic, technical, social and political aspects?

## 2.2 Literature Review of the Last Mile Delivery of Online groceries

This literature review first focusses on the methodology in section 2.2.1. The results are then presented and discussed in section 2.2.2. This leads to a set of knowledge gaps.

### 2.2.1 Literature Review Method

For this review, *Scopus* has been used to identify research papers, because “this abstract and citation database delivers the broadest overview of global interdisciplinary scientific information that has been

reviewed and selected by an independent Content Selection and Advisory Board (CSAB)” (Elsevier, n.d.).

Several literature reviews have been conducted about last mile deliveries and innovations (Ranieri, et al., 2018; Anand, et al., 2012). Ranieri et al. (2018) has reviewed the literature for finding last mile logistics innovations with a focus on externalities cost reductions. For capturing the last mile delivery in his search, they used the following terms: “last mile logistics”, “last mile delivery”, “urban logistics” and “freight transport”. Anand et al. (2012) reviewed the literature on city logistics modeling efforts that captures the literature of urban goods movements such as the last mile delivery of groceries. They used the following terms: “city logistics”, urban goods movement”, “urban freight transport”, urban distribution”, “urban logistics”, “city distribution”, “sustainable freight transport” and “sustainable transport development”. Besides “urban logistics”, a lot of different keywords has been used. Therefore, combinations of all these keywords with “online grocery” or “e-grocery” has been applied using the Boolean operators and brackets: (online grocery OR e-grocery) AND *keywords* e.g. (online grocery OR e-grocery) AND last mile delivery. This leads to 21 results. By reviewing the title and abstract, 5 papers were removed that did not consider the last mile delivery of online groceries at all. This leads to a total of 16 papers that are reviewed in section 2.2.2 (See table 1).

**Table 1.** List of reviewed research papers

	Author(s)	Titles of papers
1.	Ehrler et al. (2019)	Challenges and perspectives for the use of electric vehicles for last mile logistics of grocery e-commerce – Findings from case studies in Germany
2.	Wollenburg et al. (2018)	From Bricks-and-mortar to bricks-and-clicks: Logistics networks in omni-channel grocery retailing
3.	Hübner et al. (2016)	Last mile fulfilment and distribution in omni-channel grocery retailing: A strategic planning framework
4.	Tadei et al. (2016)	An ICT-based reference model for e-grocery in smart cities
5.	Vanelsländer et al. (2013)	Commonly used e-commerce supply chains for fast moving consumer goods: comparison and suggestions
6.	Al-Nawayseh et al. (2013)	An adaptive decision support system for last mile logistics in e-commerce: a study on online grocery shopping
7.	Murphy (2007)	Grounding the virtual: The material effects of electronic grocery shopping
8.	Kull et al. (2007)	Last-mile supply chain efficiency: An analysis of learning curves in online ordering
9.	Barnett & Alexander (2004)	The seven-step model for e-grocery fulfilment
10.	Pan et al. (2017)	Using customer-related data to enhance e-grocery home delivery
11.	Zissis et al. (2016)	A New Process Model for Urban Transport of Food in the UK
12.	Zissis et al. (2018)	Collaboration in urban distribution of online groceries
13.	Saskia et al. (2016)	Innovations in e-grocery and Logistics Solutions for Cities
14.	Yadav & Saxena (2019)	Maximizing pickup efficiency and utilization in online grocery: two-phase heuristic approach
15.	De Kervenoael et al. (2011)	Online grocery provision resistance: understanding urban (non-) collaboration and ambiguous supply chain environments
16.	Seebauer et al. (2016)	Carbon emissions of retail channels: the limits of available policy instruments to achieve absolute reductions

## 2.2.2 Results of the Literature Review

This section presents the results of the literature review on the identified papers in table 1. The papers are reviewed on the key factors identified in the papers that can be clustered in economic, technical, social or political categories (Feitelson & Salomon, 2004). Besides, also the approaches frameworks used in the papers are presented. Lastly, the key stakeholders involved in the research are also scanned. The results are presented in table 2.

**Table 2.** Results of reviewed research papers

	Author(s)	Key factors related to Economic (E), technical (T), social (S) or/and political (P) feasibility	Approach/ Framework used	Key stakeholders involved in the research
1.	Ehrler et al. (2019)	P: 1. Subsidies needed from politics 2. Regulatory needed T: 1. Improvement of electric vehicles' (EV) technologies 2. Infrastructure is needed e.g. parking, charging infrastructure, but also planning tools for coping with charging requirements, loading infrastructure and dynamic routing E:1. Investment and initiative needed for shift to EV 2. No economies of scale in early phase	Case study	Logistics service provider
2.	Wollenburg et al. (2018)	T: 1. Delivery in time windows 2. Inventory allocation problem to online and store customers if delivery is from store 3. Possible virtual shelf extension if all orders are from DC. 4. Higher customer service levels if products picked in online DC and remainder added in store 5. Different delivery times and frequencies make joint delivery complex S: 1. Balancing demand over the day 2. Customer and packer compete at in-store picking – low service level in store 3. Centralized inventory improves service and freshness level E: 1. high transportation costs from DC to customer compared to from store 2. Better utilization of transport capacity if from DC than from store. 3. Centralized inventory improves holding costs 4. High costs for storing and picking and investments costs	Case study and face-to-face interviews	Managing directors of logistics, IT and e-commerce departments
3.	Hübner et al. (2016)	S: 1. population density 2. Customer behavior for possibility of unattended home delivery T: capability for cross-channel process integration	Interviews and literature study	Grocery retail and logistics experts
4.	Tadei et al. (2016)	E: 1. transportation cost to DC 2. the investments required e.g. for highly automated centers 3. Low gross margins of products S: low willingness to pay for delivery fee T: 1. Difficulty to guarantee the food temperature 2. Synchronization of handling operations and fleet of vehicles	Simulation-optimization approach	-
5.	Vanelslander et al. (2013)	T: 1. Delivery options offered by grocery retailers 2. picking method e.g. from store or DC E: 1. return policy has high costs. However, it also offers an extra service to the customers 2. Volume 3. Customer density P: 1. Wage levels 2. Legislation	Activity-Based-Costing (ABC)	-
6.	Al-Nawayseh et al. (2013)	T: 1. Time constraint 2. Lack of suitable delivery modes 3. Poor service quality 4. Product quality 5. Product delivery P: Security and privacy issues	Design an e-commerce logistical decision support system by using My Route Online	-
7.	Murphy (2007)	T: 1. Ease in locating items 2. Stocks availability good 3. Delivery slot availability 4. Customers with substitutions 5. Customers with missing items 6. Provide ease of use 7. Intelligence of grocery websites	Using interviews with key participants,	Bricks and clicks retailers, pure

		S: Focusing on target groups: 1. Time-poor wealthy households that are too busy with time-intensive jobs or social lives 2. Parents with young children 3. The car-less due to choose or apartment living for whom groceries carrying to their houses could be backbreaking 4. The less abled and elderly 5. Technofreaks who prefer using a computer to shop 6. Lifestylers who use online shopping to buy hard-to-get items like specialty food or products. E: 1. Rise of drop density due to higher volume 2. Economies of scale	industry reports and media coverage	players and infomediaries
8.	Kull et al. (2007)	T: Learnability of websites and ordering time	Nonlinear regression for analyzing empirical data	-
9.	Barnett & Alexander (2004)	E: drivers for revenue and costs are 1. Speed required 2. Range of deliveries 3. Conditions of delivery 4. Bundled services 5. Sales concentration 6. Population density 7. Total population	Self-developed optimal seven-step model to link lowest delivery costs to a given customer density	Third party fulfilment
10.	Pan et al. (2017)	T: 1. Ordering interface and product information 2. Product range availability 3. Suitable logistical delivery options 4. Consistency between all sales and media channels	Data mining and optimization methods	-
11.	Zissis et al. (2016)	E: transportation costs S: Better customer services in terms of time windows and on time deliveries P: Road congestion and CO <sub>2</sub> emissions	Co-opetition model developed from a Bayesian game	-
12.	Zissis et al. (2018)	E: operational costs P: 1. carbon emissions 2. Traffic 3. Noise	Mixed method based on simulation and mathematical modelling	-
13.	Saskia et al. (2016)	T: 1. offering simple order process 2. Speed 3. Reliable deliveries	Literature review and short interviews	e-grocers
14.	Yadav & Saxena (2019)	E: cost burden of 1. Portal management 2. Picking orders 3. Delivery of order 4. Managing seamless service	Analytical approach	-
15.	De Kervenoael et al. (2011)	S: resistant to collaborate among the retailers due to 1. Ideological 2. Functional 3. Regulatory 4. Spatial reasons	Interviews	Retail, logistics, and urban planning experts
16.	Seebauer et al. (2016)	P: Carbon emissions	Household survey, carbon footprint assessment and an economic model	Citizens

Table 2 shows that many types of researches have been conducted that differ in the involvement of stakeholders, the approaches and frameworks used, which has also led to the identification or focus on different key factors. As can be seen in the third column in table 2, this has resulted in many key factors of online grocery deliveries. These factors can easily be structured in the categories identified by Feitelson and Salomon (2004). However, given the different focusses of the researches the identified factors are difficult to compare e.g. Ehler et al. (2018) only focused on electrical vehicle challenges, while Kull et al (2007) only focused on the online ordering processes. Therefore, it is unknown what factor is more crucial than other factors since no research explicitly focused on identifying success and failure factors of the whole process and system of the last mile delivery of online groceries.

The types of researches can be distinguished between qualitative research and quantitative research. For most of the qualitatively researches, case studies, surveys and interviews were conducted (Ehler, et al., 2018; Wollenburg, et al., 2018; Hübner, et al., 2016; Murphy, 2007; Saskia, et al., 2016; De Kervenoael, et al., 2011). The field of research differed among these reviewed literatures. Ehler et al. (2018) determined challenges and perspectives for using electrical vehicles in online grocery shopping by analyzing the German online grocery market. Murphy (2007) mainly focused on the different types of online grocery shopping providers in the UK market. Saskia et al. (2016) compared the French and German online grocery market with the focus on innovations and logistics solution for cities. However, no research has explicitly been focused on the most crucial success and failure factors for enhancing the viability of online grocery shopping of the Netherlands. Only Wollenburg et al. (2018) has involved the perspective of a Dutch retail company in their research. They conducted interviews with 12 case companies from six European companies, from which one interview with a Dutch company, in order to explore internal logistics networks of online groceries for bricks-and-clicks companies. However, there was no explicit focus on exploring success and failure factors of the Dutch market in this research. The stakeholders involved in these researches are mostly grocery retailers, logistics service providers and experts. These were also categorized by Feitelson & Salomon (2004) as the most essential groups for innovations. However, no Dutch stakeholders have been involved in any of the other researches besides one company in the research of Wollenburg et al. (2018).

The quantitative researches involve simulation, mathematical and/or optimization models (Tadei, et al., 2016; Vanellander, et al., 2013; Kull, et al., 2007; Barnett & Alexander, 2004; Pan et al., 2017; Zissis et al., 2016; Zissis et al., 2018; Yadev & Saxena, 2019). Many approaches are used e.g. Yadev & Saxena (2019) used an analytical approach for optimizing the picking system, while Kull et al (2007) applied nonlinear regression to analyze empirical data. Also new models were developed e.g. the seven-step model by Barnett & Alexander (2004) for linking lowest delivery costs to a given customer density. Given both the qualitative and quantitative approaches and frameworks, no evaluation method has been used that not only explored the challenges or optimized certain solutions, but also used the insights of the key factors to develop innovative solutions to enhance the last mile delivery of online grocery shopping.

This literature review has led to the identification of several knowledge gaps that are summarized as follows:

1. No research has been focused on the success and failure factors of the last mile delivery of online grocery shopping in the Netherlands and to what extent these are important.
2. No comprehensive research exist that used these success and failure factors to propose innovative solutions to enhance the viability of online grocery shopping in the Netherlands.

3. No framework or evaluation method have been used that used success and failure factors for determining and evaluating solutions for enhancing the viability of online grocery shopping.

### 3. Methodology: MAMSFFMCA

In order to conduct a comprehensive research on the use of success and failure factors for determining and evaluating solutions for enhancing the viability of online grocery shopping, a suitable method should be found or developed. This is done in section 3.1. In this section, a new evaluation method called the Multi-Actor Multi-Success-and-Failure-Factor Multi-Criteria Analysis (MAMSFFMCA) is developed. Section 3.2 focuses on how to perform every step of this method. Section 3.3 will provide a summary of this method and the relevance to the Msc Complex Systems Engineering and Management (COSEM) program, since the methodology has been developed and applied in order to fulfill the last requirements for this master program.

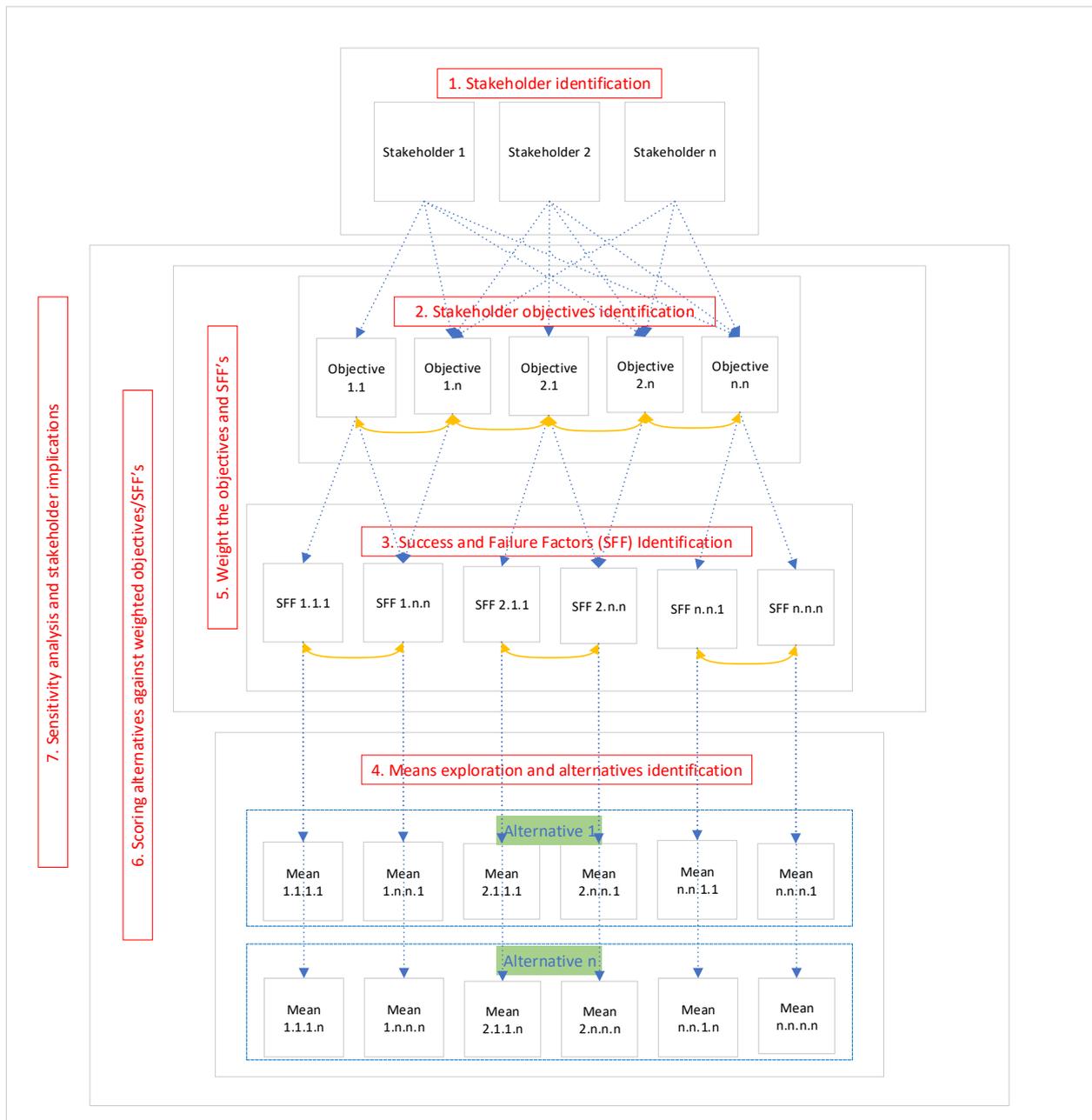
#### 3.1 Evaluation Method for Last Mile Delivery Solutions: MAMSFFMCA

The multi-criteria analysis (MCA) has been used in several studies that focused on last mile deliveries (Titiyal, et al., 2019; Kiousis, et al., 2018; Aljohani & Thompson, 2019 & Gogas & Nathanail, 2017). Multi-criteria analyses are used in researches to assess different alternatives against a set of criteria (Gerçek, et al., 2004). Titiyal, et al. (2019) used a multi criteria analysis method that could be used by a grocery retailer in order to assess the fulfilment objectives and to propose which areas could be improved, while Kiousis et al. (2018) used a multi-criteria framework to assess the impacts of smart lockers on traffic and environment. However, in the research of Titiyal, et al. (2019) only the objectives of one stakeholder was taken into consideration and in the research of Kiousis et al. (2018), all the effects on every stakeholder were assessed by the same set of criteria determined by the researcher.

Therefore, a more interesting method is applied by Aljohani & Thompson (2019) and Gogas & Nathanail (2017) that used a Multi-Actor Multi-Criteria Analysis (MAMCA) in their researches. This MAMCA method does allow the incorporation of the objectives and opinions of different stakeholder groups in a structured way through the whole complex decision-making process which enhances the suitability and practicability of the outcomes compared to the traditional MCA methods (Macharis & Bernardini, 2015). The steps described by Macharis (2007) are as followed:

- Step 1: Defining the problem and the alternatives
- Step 2: Stakeholder analysis
- Step 3: Define criteria and weights
- Step 4: Criteria, indicators and measurement methods
- Step 5: Overall analysis and ranking
- Step 6: Result and sensitivity analysis
- Step 7: Implementation

There are different means in MAMCA methods to gather alternatives, criteria and their weights (Macharis & Bernardini, 2015). However, it remains quite vague and general how this process should be done in a reproducible way that also enhances the adoption of the innovative alternatives. According to van de Kaa and de Vries (2015), MCA methods (e.g. MAMCA) could also be used to examine whether some crucial success and failure factors are more important than others. However, no framework exists that incorporates the success and failure factors in the MAMCA. Besides, it is also not clear how the success and failure factors can enhance the adoption of the proposed solutions. Therefore, a new integrated framework has been developed named the Multi-Actor Multi-Success-and-Failure-Factor Multi-Criteria Analysis (MAMSFFMCA). This framework is presented in figure 3.



**Figure 3.** Integrated Framework of Success and Failure Factors with Multi-Actor Multi-Criteria Analysis

The developed integrated framework has the shape of a pyramid that follows the natural sense of doing an explorative research. It starts at the top where no or just a little is known about a problem (Brown, 2006).

### Step 1. Stakeholder identification

The first step starts with the identification of the stakeholders. As defined by Freeman (2010), a stakeholder is ‘an individual or group of individuals that are influenced by or can influence the achievement of organization’s objectives.’ Thus, it is first important to determine what parties can influence or is influenced by the system the most. This step is different from the traditional MAMCA approach, that identified stakeholders in step 2 after the problem definition and the alternatives identification. The reason why stakeholders should be identified first, is because early involvement of

stakeholders help to better understand the problem and the priorities of every party and thus enhance the acceptance of the proposed solution (Banville, et al., 1998).

#### Step 2. Stakeholder objectives identification

The second step is to identify the objectives of every key stakeholder. The objectives of the stakeholders is used as criteria just as described by Macharis et al. (2012) for the MAMCA. As discussed in section 2.1, the measurement of a success depends on the objectives of the different stakeholders in the system. Overlap of these objectives can occur, since different stakeholders might have the same objectives. Therefore, it is important for the researcher to validate this with the stakeholders in order to avoid double counting. The most important objectives are selected based on the frequency or the relevance. This leads to a list of objectives/criteria that is used for the evaluation process.

#### Step 3. Success and Failure Factors (SFF) identification

The third step is to identify the SFF's for every objective. Success factors define desired conditions that has led to a successful achievement of an objective from which we can learn, while failure factors are undesired challenges that still needs to be overcome in order to reach a certain objective. By using these success and failure factors identified by involving different stakeholders for proposing solutions, the risk of failure of the adoption of the innovations is minimized (Ngai et al., 2008). These success and failure factors are related to objectives of the most important stakeholders identified in step 2. Every stakeholder is be asked to determine key factors that has led to the (un)successful achievement of an objective. These SFF's are then be categorized and analyzed with a suitable SFF framework. From these, the most important ones must be selected based on the frequency or in collaboration with stakeholders and experts.

#### Step 4. Means exploration and alternatives identification

The fourth step is to use the success and failure factors to propose new solutions. This step bridges the gap of the practical usefulness of analyzing success and failure factors and using it to design, measure, evaluate and propose (innovative) alternatives. As opposed to the MAMCA that used a pre-determined set of alternatives or performed an extensive literature overview for determining alternatives followed by a feasibility screening (Macharis et al, 2012), the MAMSFFMCA is more suitable for explorative research where there is not a pre-determined set of alternatives or barely any previous research and literature. The analysis of success and failure factors leads to the identification of means for the alternatives. Thus, these alternatives are based on the lessons learned from the success factors and have means that avoid the failure factors. After generating the objectives, the SFF's, the alternatives, a final set of alternatives must be selected based on how likely the alternative can overcome the identified failure factors or make use of the success factors. This has led to the bottom of the pyramid since all the qualitative data has been gathered (see figure 3).

#### Step 5. Weight the objectives and the SFF's

In the fifth step, the gathered data is taken together to compute the analysis. Therefore, in figure 3, these steps are displayed as combinations of the previous steps. The fifth step is focused on giving weights to the objectives/criteria and the SFF's. For the MAMSFFMCA, the list of most important identified success and failure factors are used to choose the best solutions, since these factors are crucial for the adoption of the innovation. These factors are first weighted. The method also allows us to make use of hierarchical clustering of the success and failure factors per key question related to the success and failure factors.

### Step 6. Scoring alternatives against weighted objectives/SFF's

In step 6, the weights of step 5 are used to assess the alternatives. For this, the analyst, the expert or the stakeholders can score the alternatives on the criteria. This depends on the expertise that every party has on the problem. Besides, the stakeholders may have a strategic bias, since their objectives and identified factors are involved (Macharis, et al., 2012). The alternatives can also be scored against the success and failure factors on a 5-point Likert Scale. In this way, for every success or failure factor, it becomes clear which alternative is the best to adapt. If alternatives have the same rating, then the interviewee can be asked to determine the best alternative. Besides, the interviewee can argue 1. why he or she give a certain rating to an alternative, 2. How the alternatives can be improved and 3. What his point of view is about an alternative besides the rating on likelihood. This enhances the quality and completeness of the alternatives. These rates can then be multiplied with how important a success or failure factor is in order to determine which alternative is the most important for enhancing the viability of online grocery shopping in the Netherlands. Besides, the best alternatives per success and failure factor can also be scored against the stakeholders' objectives. After scoring the alternatives on every objective, these scores are multiplied by the weights of each objective. By summing the scores for every alternative, the weighted sum score (WSC) is calculated that can be compared on which alternatives have the highest adoption chance among the other best alternatives.

### Step 7. Sensitivity analysis and stakeholder implications

In the last step, a sensitivity analysis must be performed and the resulted implications for stakeholders. Since a lot is subjective results were gathered e.g. the weighting of the criteria and the scoring of the alternatives, it is important to do a sensitivity analysis. This might influence the result and leads to implications for the stakeholders. This is done by changing the weights of the objectives or the success and failure factors. It is proposed to change all the objectives to the same weight in order to assume that all the objectives of different stakeholders are equally important. Given this change, it can be seen whether the best solutions are still preferred that show how robust the solution is.

## 3.2 Research Methods

For every step of the MAMSFFMCA, it must become clear what data needs to be gathered, what methods must be used to gather these data and what tools could be used to analyze these data.

### Step 1. Stakeholder identification

As defined by Freeman (2010), a stakeholder is 'an individual or group of individuals that are influenced by or can influence the achievement of organization's objectives.' The main challenge for this research is the difficulty of sourcing primary data on commercial transport, since data is either not available or grocery retailers are not reluctant to share data as they are not allowed to disclose their logistics' structures (Ehler, et al., 2018). Therefore, the starting point of this stakeholder analysis is secondary resources on the Dutch online grocery market. This includes (news) articles, website pages, online grocery order apps and year reports.

Besides, informal interviews with experts are held in order to identify more stakeholders and to validate the current list. For identifying the operational stakeholders, informal interview are held with operational workers in the last mile delivery of Albert Heijn Online. This has been validated by conducting an empirical research in which the researcher takes part of the last mile delivery of groceries with an experienced deliverer of Albert Heijn Online.

## Step 2. Stakeholder objectives identification

The objectives of the stakeholders concerning the last mile delivery of online groceries has been used as criteria just as described by Macharis et al. (2012) for the MAMCA. Therefore, it is important to determine what stakeholders should be involved in the evaluation phase. For this, it is first important to determine what parties can influence or are influenced by the system the most. According to Feitelson & Salomon (2004), besides people working in the industry, experts drive innovations the most. Therefore, experts have been interviewed to identify what stakeholders' objectives should be involved. The chosen method is a semi-structured interview. The reason why a semi-structured interview is used, is because a semi-structured interview, compared to an unstructured interview, allows the interviewer to determine that the focus of the conversation is on the subjects and issues that are important for the research (Brinkmann, 2014). Due to time constraints, the busy schedules of the interviewees and the fact that not all the stakeholders are very reluctant to share data, also the success and failure factors and an initial list of alternatives must be gathered from these semi-structured interviews. This is not preferred since this might lead to incomplete or vague answers. The best scenario was if every interviewee had time to meet for every part to elaborate their view in more detail and after all the interview sessions, to discuss the results and validate their opinion.

From the identified lists of stakeholders, not all the stakeholders can be approached and interviewed. This is because of time constraints and the connectivity constraint. Therefore, the first activity is to meet up with my supervisor and to determine what stakeholders should be approached. These key stakeholders are determined based on:

1. their decision-making power in the last mile delivery of online groceries
2. the knowledge they have on the last mile delivery of online groceries
3. the willingness to help and
4. the connectivity; how easy it is to approach a stakeholder via connections

These criteria are set due to practical reasons, because it is important to get as much and useful data in a small amount of time that is given for this thesis.

After having selected the key stakeholders, it is important to determine how to approach the parties. This is done via many ways e.g. LinkedIn, Mail or WhatsApp. Each channel needs a different approach and pre-determined messages to the stakeholders. These messages are checked by Accenture experts before sending it. The approaching strategy has been described in appendix B.

Besides identifying the most important stakeholders, experts are asked to describe the objectives that must be reached for a successful last mile delivery of online groceries. They can either describe it from a system perspective as for a stakeholder specific perspective e.g. grocery retailer's perspective since they have a lot of knowledge about these parties, or customer perspective since they might be a customer themselves or have a lot of knowledge about their perspective. The stakeholders from the industry are asked to describe their own objective for the last mile delivery. These data are then aggregated in a table and discussed based on the number of times an objective is mentioned and the relevance for enhancing the viability of online grocery shopping in the Netherlands. This leads to a list of objectives that is used for the evaluation process.

## Step 3. Success and Failure Factors (SFF) identification

In order to enhance the viability of online grocery shopping in the Netherlands, it is important to determine what both the success and failure factors are. These success and failure factors are related to objectives of the most important stakeholders identified in step 2. For this, it is first important to

analyze the current business models of the online grocery shopping systems of the providers in order to know in what category, location or platform, decision making take place that differentiate the different models. However, due to time constraints and the fact that Albert Heijn, Jumbo and Picnic take up almost 90% of the online grocery market (de Best, 2019), only their online business models are analyzed and compared by using secondary resources such as their websites, apps and articles, but also having informal interviews with the stakeholders.

Besides, every stakeholder are asked to determine key factors that has led to the (un)successful achievement of an objective. This leads to a set of success and a set of failure factors. Success factors define desired conditions that has led to a successful achievement of an objective from which we can learn, while failure factors are undesired challenges that still needs to be overcome in order to reach a certain objective.

The success and failure factors are gathered from semi-structured interviews as described in step 2. For gathering success factors, interviewees are asked to explain how they successfully reached a certain objective. For gathering failure factors, interviewees are asked to explain why certain objectives are still not reached. Given the time constraints described in step 2 and the fact that there is a lot of discussion about the viability of online grocery shopping, the focus during the interviews are on the failure factors, since this leads to a set of challenges that can be tackled in order to enhance the viability of online grocery shopping. These factors are clustered in the categories elicited from the business models of Albert Heijn, Jumbo and Picnic. From these success and failure factors, key last mile delivery challenges are elicited for the viability of online grocery shopping. This is done by comparing how often a certain success or failure factor is mentioned and the interpretation of the interviews with stakeholders and experts. Within every key challenge, five associated success and failure factors are clustered that are relevant to tackle the challenge. This analysis has been validated with an Accenture expert and leads to a set of crucial success and failure factors.

#### Step 4. Means exploration and alternatives identification

This step bridges the gap of the practical usefulness of analyzing success and failure factors and using it to design, measure, evaluate and propose (innovative) alternatives. As described in step 2, the interviewees is asked to come up with alternatives for reaching a certain objective given the challenges of the identified success and failure factors. This leads to an initial list of alternatives/means. Also due to time constraints, the fact that some interviewees are not reluctant to share new ideas or simply because they cannot come up with new alternatives, these alternatives/means cannot be gathered for every objective or interview. Therefore, a brainstorm session is held with the value office team of six Accenture consultants or interns due to their experience in creating value given certain challenges. Ideally, the stakeholders should take part in this session. However, that was not possible due to time constraint.

For aggregating the means into a final set of alternatives, a morphological chart given in table 3 is used. A morphological chart is a tool to help generate alternatives by identifying means for each function that a system must have (Dym, et al., 2014). The functions are listed on the left-hand column of a table, which is completed by adding means that can be used to implement a certain function at each row of functions. Each alternative or design then consist of a mean from every functional row in order to achieve all the functions that the system must have. According to Dym et al. (2014), functions are identified to define what a design must do, and means are able to fulfill this function. However, alternatives for a certain problem can take various forms e.g. investments in infrastructure or long-term strategic options for policy measures (Macharis, et al., 2012), which means that identifying means

for functions of a system do not cope with the problem setting. Since every objective can be achieved or blocked by a certain success or failure factors, every success or failure factor needs to be overcome by another alternative in order to have a higher success chance to enhance the system. Therefore, the success and failure factors are listed on the left-hand column of the morphological chart instead of the functions and alternatives in the other columns (See table 3).

A way to come up with the alternatives is to organize a brainstorm session to use the 6-3-5 design thinking method. The reason why Dym et al (2014) described the name of this design generation activity as the 6-3-5 method is because originally six people sit around a table, which can differ. Every member then write down three design ideas, which are described in key words or phrases. The list of solutions is then be circulated past each person in a sequence of five rotations. People are then expected to write down comments or annotations. It is not allowed to communicate with each other during this session. Each list is then be discussed, evaluated and added to the morphological chart. Due to time constraint, at least one alternative per success or failure factor had to be proposed and not all the papers were past in five rotations. In the end, this leads to a list of alternatives for enhancing the system from which a selection can be made of the best alternative per success or failure factor.

**Table 3.** Morphological chart for exploration of means MAMSFMCA

Success factors	or	failure	Possible alternatives		
<b>Success factor 1</b>	<b>or</b>	<b>failure</b>	<b>Alternative 1.1</b>	<b>Alternative 1.2</b>	<b>Alternative 1.3</b>
<b>Success factor 2</b>	<b>or</b>	<b>failure</b>	<b>Alternative 2.1</b>	<b>Alternative 2.2</b>	<b>Alternative 2.3</b>
<b>Success factor 3</b>	<b>or</b>	<b>failure</b>	<b>Alternative 3.1</b>	<b>Alternative 3.2</b>	<b>Alternative 3.3</b>
<b>Success factor 4</b>	<b>or</b>	<b>failure</b>	<b>Alternative 4.1</b>	<b>Alternative 4.2</b>	<b>Alternative 4.3</b>
<b>Success factor 5</b>	<b>or</b>	<b>failure</b>	<b>Alternative 5.1</b>	<b>Alternative 5.2</b>	<b>Alternative 5.3</b>

However, due to the short time for the interviews with experts and stakeholders, and the brainstorm session with not the most ideal group for this topic, the researcher also perform an empirical research to identify alternatives. As described in step 1, the researcher takes part of the last mile delivery of groceries with an experienced deliverer of Albert Heijn Online in order to get an operational perspective. Besides, the researcher has also ordered groceries from Picnic in order to get a customer perspective. Combined with the desk research and the interviews with experts and stakeholders, these perspectives allow the researcher to come up with alternatives as well.

This eventually leads to three alternatives per success and failure factor. One elicited from stakeholder and expert interviews, one from an outside in brainstorm session and one from the perspective of the observations of the researcher.

### Step 5. Weight the objectives and the SFF's

In order to determine how crucial, the objectives and the SFF's are for grocery retailers, first a multi-criteria analysis method should be determined that allows us to compare the success and failure factors with each other and the objectives among each other. For the MAMCA, a mixed method of MCA techniques such as Analytical Hierarchy Process (AHP) and the Preference Ranking Organisation MeTHod for Enrichment Evaluations (PROMETHEE) has been proposed to use for weighting criteria (Macharis, et al., 2004). However, as discussed in the paper of Macharis et al. (2004), the main disadvantage of AHP is that the number of pairwise comparison of all the success and failure factors may become very large and the main disadvantage of PROMETHEE is that it does not provide a specific guideline to determine weights. The last disadvantage has been tackled with the mixed method. However, the main disadvantage is that it is still very time consuming. Therefore, a 'Direct Matrix Ranking' (DMR) has been used to score the objectives and the success and failure factors. The DMR stands out for its speed and the added value for the participants, which is very important for this research since all the stakeholders and experts do not have a direct interest in this research and are thus not very willing to spend a lot of time on it (Chambers, 1998). The DMR described by Chambers (1998), has some similar steps as the MAMSFFMCA:

1. Choose an individual or group
2. Determine objectives
3. Ask the involved parties to name the most important ones
4. Elicit criteria
5. List all the criteria and turn all the criteria into the same format
6. Draw up a matrix with each objective on top and criteria on the left
7. Ask which objective is best by each criterion

However, some adjustments must be made to make it practical for the MAMSFFMCA. So, the individuals or groups chosen for this step are both grocery retailers since they decide how to develop their online grocery shopping system. The selection of the most important objectives has already been taken place in step 2 based on how often the involved parties have mentioned an objective. These objectives are used as criteria and are rated on how important they are in order to gain weights for comparison (Macharis, et al., 2012). For this a survey is used. A survey is a structured interview method in order to quantify the objectives and success and failure factors for comparison (Brinkmann, 2014). For this survey, a 5-point Likert Scale is used instead of a ranking, since this is less time consuming for the interviewee rather than pairwise comparing the objectives. Another method used to assign scores to each alternative is a ranking method called the best-of-class chart (Dym, et al., 2014). This method ranks the alternatives for every objective or criterion e.g. from 1 for the best alternative, 2 for second best, and so on. However, this method does not show actual results, which means that it is not possible to see whether certain results are close e.g. if the best alternative have a score of 5, the ranking is the same whether the second best has a score of 1 or 4.

Therefore, a 5-point Likert Scale (1=unimportant, 2=slightly important, 3=moderately important, 4=important and 5=very important) is employed since this is most often used and it has few categories to choose from (e.g. compared to a 10-point Likert Scale) that can enhance the respondents' consistency (Jamieson, 2004 and Adelson & McCoach, 2010). However, according to Brinkmann (2004), the survey does not take advantage of the dialogical potentials to gain knowledge. Therefore, the structured interview has been held in real-life and offer the interviewee the opportunity to give his opinion that is taken into consideration. The results can reveal which objective is more important than others for evaluating the alternatives. Usually, all the stakeholders must determine the weights for

their objectives according to the MAMCA method (Macharis, et al., 2012). However, for online grocery shopping, the grocery retailers implement the idea. Therefore, it is important to know which objectives have what priority for the grocery retailer.

Furthermore, it is important to rate the key challenges and success and failure factors identified in step 3 on its importance for grocery retailers. For this the same survey and 5-point Likert Scale is used. The results can reveal which factors and key questions are more important than others for the viability of online grocery shopping in the Netherlands.

#### Step 6. Scoring alternatives against weighted objectives/SFF's

The three categories of alternatives in step 4 has been compared with each other by the same grocery retailers that rated the success and failure factors in step 5. In the same survey, the interviewee is asked to rate the alternatives against the success and failure factors on a 5-point Likert Scale (1=Definitely not, 2=Probably not, 3=Possibly, 4=Probably and 5=Definitely) in order to determine how likely the alternatives can overcome the failure factors or comply with the success factors. In this way, for every success or failure factor, it becomes clear which alternative is the best to adapt. If alternatives have the same rating, then the interviewee can be asked to determine the best alternative. Besides, the interviewee can argue 1. why he or she give a certain rating to an alternative, 2. How the alternatives can be improved and 3. What his/her point of view is about an alternative besides the rating on likelihood. This enhances the quality and completeness of the alternatives. These rates can then be multiplied with how important a success or failure factor is in order to determine which alternative is the most important for enhancing the viability of online grocery shopping in the Netherlands.

Besides, the best alternatives per success and failure factor is also scored against the stakeholders' objectives on a 5-point Likert Scale (1= - - =very negative impact, 2= - = negative impact, 3= +/- = no/barely any impact, 4= + = positive impact and 5= + + = very positive impact). The reason why this is done instead of finding the values of every alternative on the objectives, is because these values are usually unknown due to the lack of literature and research in this field. Besides, this is also a good way to engage the stakeholders again in order the enhance the acceptability. Furthermore, the interviewee is asked to fill in absolute numbers since this is less writing and thus less time consuming for the interviewee. However, a negative impact must be counted as negative, thus the following scores are used for calculations: -2= - - =very negative impact, -1= - = negative impact, 0= +/- = no/barely any impact, 1= + = positive impact and 2= + + = very positive impact.

After scoring the alternatives on every success and failure factor, these scores are multiplied by the weights of each objective. By summing the scores for every alternative, it can be compared which alternative have the highest adoption chance among the other best alternatives.

#### Step 7. Sensitivity analysis and stakeholder implications

After having the scores, it is also important to determine how robust all the solutions are. This combined with the results from step 6 leads to implications for the stakeholders.

The first activity is to perform a sensitivity analysis. This is done by changing the weights of the objectives or the success and failure factors. Therefore, a change is to give all the objectives the same weight. Given this change, it can be seen whether the best alternatives are still preferred.

The results of these scores and the sensitivity analysis can have implications for certain stakeholder groups. It is important to describe what it means for a stakeholder group if an implementation of a certain result takes place and what role the stakeholder must play.

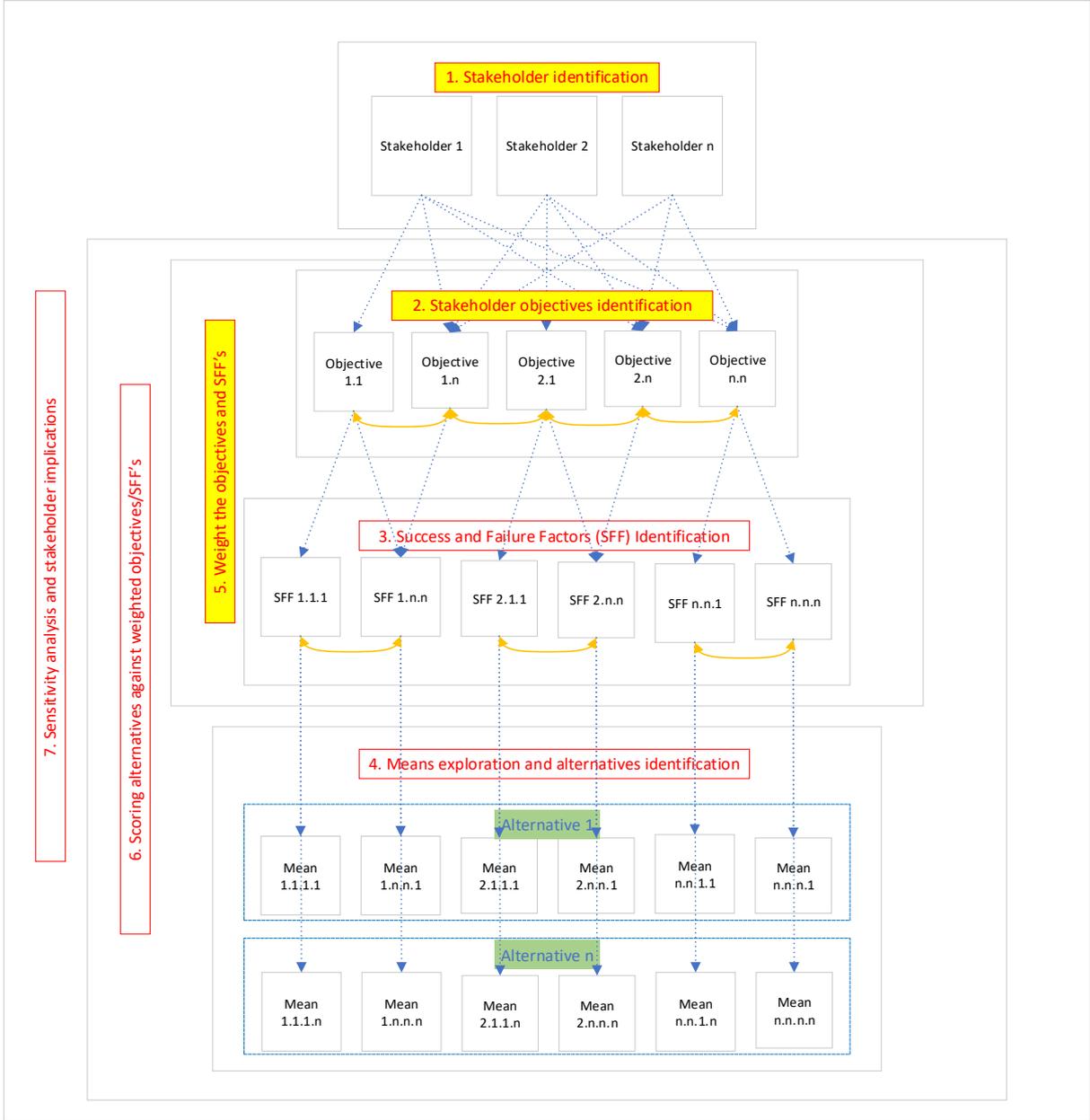
### 3.3 Summary MAMSFFMCA and relevance to the MSc Complex Systems Engineering and Management (CoSEM) program

The MAMSFFMCA incorporates success and failure factors in the MCA in order to propose and evaluate (technical) solutions in a structured way from different stakeholder perspectives (See figure 3). This method also allows the evaluation of success and failure factors for the adoption of a certain (technical) innovation. The MAMSFFMCA engages stakeholders in identifying and evaluating the success and failure factors, since the success or failure of a certain innovation depends on the stakeholders' objectives. For this, a stakeholder analysis must first be performed. The most crucial success and failure factors lead to the proposal of solutions. For proposing solutions, a design engineering tool called the morphological chart is used after eliciting alternatives in a brainstorm session and during interviews (Dym, et al., 2014). For both the evaluations of the solutions and the success and failure factors, MCA methods can be used e.g. AHP, PROMETHEE or DMR (Chambers, 1998; Macharis, et al., 2004). Thus, the MAMSFFMCA allows to design solutions in a complex socio-technical system by applying both systems engineering approaches as multi-actor decision-making methods.

Given these elements, this method is exemplary for the MSc CoSEM program for several reasons. First, in the MSc CoSEM program, the course "innovations in transport and logistics" has been devoted to help analyzing success and failure factors and to use these factors to build success and failure frameworks. These skills have been applied in this thesis by building the MAMSFFMCA. Second, an actor-analysis is performed, which is part of the problem identification phase of the design approach that has been applied in the "Complex systems engineering" course (Peffer, et al., 2007). Third, the stakeholders are involved in the decision-making process by conducting interviews. For this, the course "managing in multi-actor decision making" has contributed to help designing and planning these processes. Fourth, setting up a brainstorm session and using design engineering tools such as the morphological chart to elicit solutions has been taught during the "introduction to complex systems engineering" course (Dym, et al., 2014). Fifth, MCA methods are used to assess the solutions based on a set of criteria/objectives. This is part of the evaluation phase of the design approach (Peffer, et al., 2007), which has been applied in both the "complex systems engineering" course as the "advanced evaluation methods for transport policy" course. Last, this method is applied on the last mile delivery system of the (online) grocery retailers. This topic is related to transport and logistics, which is one of the specializations of the CoSEM program.

### 4. Stakeholder Analysis

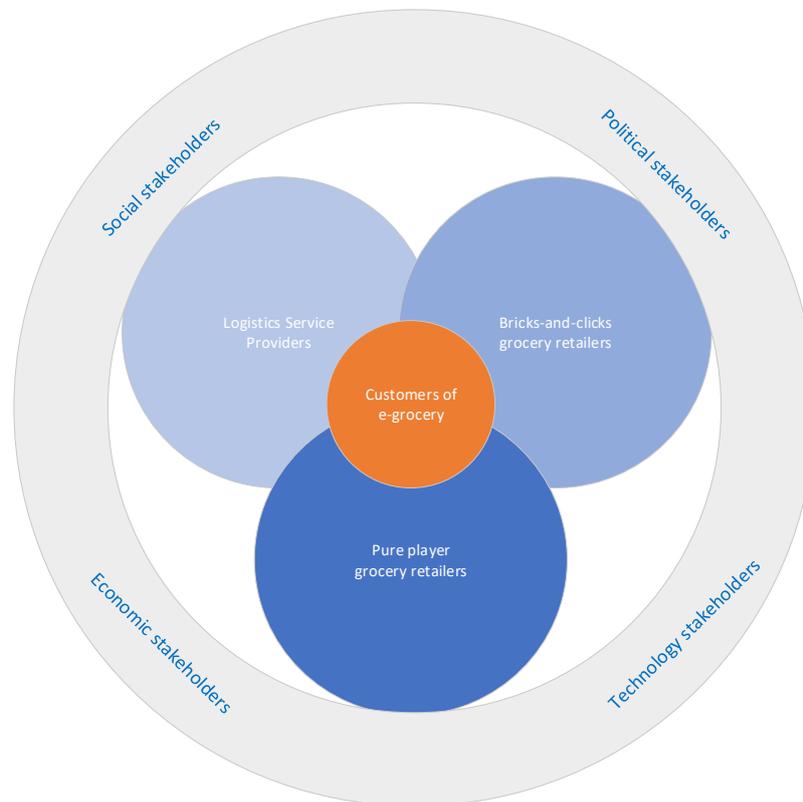
This chapter focusses on the first, the second and part of the fifth step of the MAMSFFMCA. These involve the stakeholder identification, stakeholders’ objectives identification and weighting of the objectives (the steps in yellow in figure 4).



**Figure 4.** Steps of the MAMSFFMCA for the stakeholder analysis

This answers the second research question:” What are the roles and objectives of various last mile delivery stakeholders in the viability of online grocery shopping in the Netherlands?” These roles can be distinguished into players in the market and stakeholders that are crucial for the viability of online grocery shopping in the Netherlands. For determining the roles of the players in the market, the Dutch online grocery market is first analyzed in section 4.1. In this section, two roles have been determined, namely the online grocery shopping providers (demand side) and the customers (supply side). This service innovation provided by the bricks-and clicks companies, pure players and logistics service

providers, needs to be technological, economic, politic and social feasible according to Salomon and Feitelson (2004). Therefore, section 4.2 is devoted to stakeholders, which role is related to the technological, economic, politic and social viability of the innovation. See figure 5 for overview. In section 4.3, the key stakeholders' objectives are analyzed in order to determine what role these stakeholders play in the evaluation process. Section 4.4 is devoted to summarize the findings and to discuss the stakeholders' objectives and the assigned weights by an independent researcher with customer perspectives and a bricks-and-clicks company.



**Figure 5.** Overview of the type of stakeholders to analyze

#### 4.1 Dutch online grocery market and its last mile delivery

For analyzing the last mile delivery of online groceries, it is first important to distinguish stakeholders from both the demand and supply side of the process. Therefore, the first stakeholder group is the Dutch consumers that are elaborated on in section 4.1.1. In section 4.1.2, the focus is on the bricks-and-clicks (e.g. Albert Heijn and Jumbo) and pure player (e.g. Picnic) grocery retailers and logistics service providers (e.g. PostNL and Thuisbezorgd.nl). Logistics service providers only do the last mile delivery for grocery retailers that do not want to do the delivery themselves, but still want to offer their customers the online grocery delivery service.

##### 4.1.1 Rise in number of Dutch customers for online grocery shopping

The revenue of the Dutch online grocery market grew from 2.9% of the total revenue of the Dutch grocery market in 2017 to 3.6% in 2018, which is a growth of 30% within a year (Rosian & Pustjens, 2019). This entailed a total revenue of 1,4 billion euros in 2018. Despite this growth, it is expected that this will not have consequences for the revenues of the physical stores due to growing number of citizens and the growth of yearly spending on groceries from 2300 to 2500 euros (Rosian & Pustjens, 2019).

According to the research of Motivaction (2019), the number of customers that do online grocery shopping grew from 13% in 2015 to 25% in 2019. For Dutch customers, the most important reasons for doing online groceries are not having to carry the groceries (47%) and saving time (46%). The reasons why people who expect themselves to never switch from physical grocery shopping to online grocery shopping are because they enjoy doing grocery shopping (54%), want to hold their products (45%) and because they do not want to pay delivery costs (38%). Remarkably, this research also reveals that the number of people that belongs to this group declined from 61% in 2018 to 55% in 2019.

The research of Motivaction (2019) also revealed that despite the growth of yearly spending on groceries, Dutch citizens spend less money online than they do during grocery shopping in physical stores. 59% of the questioned citizens say that they do fewer impulse buys online compared to at a physical store, while 55% are more conscience of the amount of money they spend. Besides, 47% are less willing to try new products or brands online than in a physical store. Given the last point, some grocery retailers offer free sample products. However, according to this research, 25% of these products will be wasted.

4.1.2 Competition among online grocery retailers and logistics service providers

The Dutch online grocery market is dominated by two bricks-and-clicks companies Albert Heijn and Jumbo and a pure player Picnic that together take up almost 90% of the market (de Best, 2019). Their market shares are compared from 2015 till 2019 in figure 6.

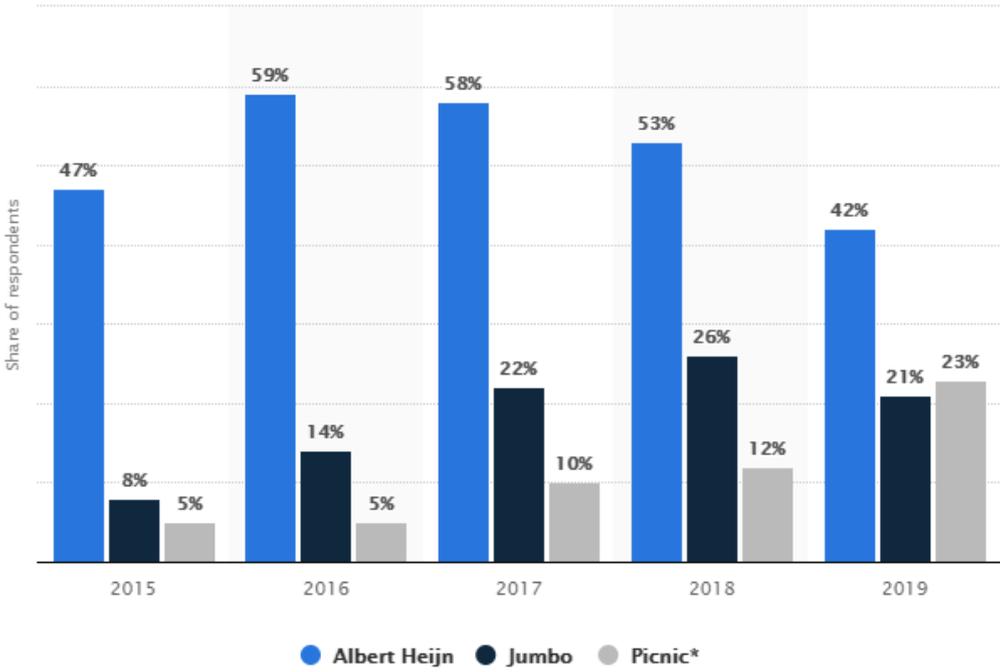


Figure 6. Market share of online grocery market Albert Heijn, Jumbo and Picnic. Retrieved from de Best (2019).

As can be seen, Albert Heijn is the largest grocery retailer on online grocery shopping since 2015 but is slowly losing shares to other companies. Jumbo has been growing from 8% in 2015 till 26% in 2018. However, Jumbo faced a fall to 21% in 2019. This is explained by the growth of Picnic from 12% in 2018 to 23% in 2019. According to the research of Growth from Knowledge, Picnic dominates at the areas it operates with an online market share of 52.7% compared to 30.7% for Albert Heijn (Business Insider Nederland, 2019). Besides these three big players, also conventional bricks-and-mortar companies

have added an online channel to their business model to become a brick-and-click company e.g. Hoogvliet, Plus and Spar (See overview in table 4). Some of these companies collaborate with logistic service providers e.g. PostNL does the last mile delivery of some orders from Hoogvliet (Twinkle, 2015). Therefore, these three stakeholder groups are analyzed in the following sections. Section 4.1.2.1 focusses on analyzing the bricks-and-clicks players. Section 4.1.2.2 focusses on the pure players, whereas section 4.1.2.3 elaborates on the logistics service providers.

#### 4.1.2.1 Bricks-and-clicks grocery retailers in the Netherlands

In 2018, the total revenue of grocery retailers in the Netherlands grew with 3.5% to 38,7 billion euros according to a research of IRI (van Loon, 2019). This research showed the market shares of Albert Heijn (34.7%), Jumbo (19.1%), the Hard Discount grocery retailers Lidl and Aldi (16.1%) and the other independent grocery retailers e.g. Plus, Boni, Coop, Spar, Hoogvliet, Deen, Poiesz that are represented by procurement organization Superunie (28.4%). From these traditional grocery retailers, many have changed to a bricks-and-clicks company (See table 4 for overview).

**Table 4.** Overview of bricks-and-clicks grocery retailers that do home deliveries in the Netherlands.

(online) grocery retail companies	Minimum order price (in euros)	Delivery costs (in euros)	Annotation
<b>Plus</b>	25	6	'Plus express' offers a service that groceries can be delivered within 2 hours by spending 2.50 euros delivery costs more.
<b>Albert Heijn</b>	50/70	0-12.95	Both depends on delivery day and time. Free delivery if you buy certain number of bonus products.
<b>Hoogvliet</b>	50	4.99-5.99	Only delivery on Tuesday, Thursday and Friday in the evening. By an ordering price higher than 70 euros, customer will get 1 euro discount on delivery costs
<b>Jumbo</b>	50	0-6	Delivery cost depend on the moment of delivery. Free delivery if you buy certain number of bonus products.
<b>Spar</b>	0	0-4,95	Delivery costs are zero if the minimum order price is more than 50 euros. Same day delivery if customer order before 10 am.
<b>DekaMarkt</b>	50	2.95-3.95	By an ordering price higher than 70 euros, customer will get 1 euro discount on delivery costs
<b>Deen</b>	40	0	Only pick up if below 40 euros.
<b>Posiesz</b>	40	0	No delivery below 40 euros.
<b>Coop</b>	40	0-4.99	Free delivery if costs are more than 70 euros or if you buy certain number of bonus products.

Table 4 provides an overview of the minimum order price, the delivery costs and annotations of every grocery retailer. The information in the tables are retrieved from the websites of designated companies on October 2019 and from a comparison website (ikvergelijkhet.nl, n.d.). This is important to mention, since the business models or prices change constantly. All the bricks-and-clicks companies in table 4 also offer pick-up services, however this service is left out of the scope of this research since the focus is the last mile delivery to people their houses.

All the bricks-and-clicks companies have a minimum order price, except for Spar. Albert Heijn has the highest minimum order price of 70 euros, except on Tuesdays, Wednesdays and Thursdays. Besides, Albert Heijn also has the highest maximum delivery costs of 12.95 euros. Except for Deen and Posiesz, all the other bricks-and-clicks companies do have delivery costs. However, these companies know that this is undesirable for the customers and thus have different kind of exceptions for these costs e.g. no delivery costs at Jumbo or Albert Heijn if customers buy a certain number of bonus products and no or less delivery costs at Spar, Hoogvliet, DekaMarkt and Coop if a certain minimum order price has been reached. Most of the companies only offer a next-day delivery service e.g. Albert Heijn, Deen and Coop. The order must be completed before a certain time to have the groceries delivered the next day e.g. Coop before 11 am and Deen before 11.59 pm. Sometimes it also happens that all the timeslots are already taken. Therefore, both Jumbo and Albert Heijn ask a higher price for popular time slots on popular days.

Only Spar and Plus (Plus Express) offer same-day delivery in various regions. At Spar, the groceries must be ordered before 10 am in order to have the groceries delivered at the same day. At Plus Express the costs will be 8.50 euros and it must be ordered before 4pm in order to have the groceries delivered within 2 hours. Remarkably, the hard discount companies Aldi and Lidl have not entered the online market in the Netherlands yet. However, Aldi did enter the UK online grocery delivery market (Borland, 2018). Thus, they might enter the Dutch market in the future as well.

Besides the opportunity to deliver from their stores, bricks-and-clicks companies also can deliver from hubs or distribution centers directly. However, grocery retailers are not reluctant to share data as do not want to disclose their logistics' structures (Ehler, et al., 2018). Some information is known on the websites of the designated grocery retailer. Bricks-and-clicks companies with small market shares e.g. Plus and Coop, deliver from their stores. Operational workers pick the groceries in the stores, pack them and load it in the delivery vehicles. On the other side, Albert Heijn mainly delivers from distribution centers and dedicated hubs (Retailtrends, 2016). Recent years, due to the growing number of customers, Jumbo is shifting from doing the last mile delivery from stores to hubs, since this is more efficient and sustainable, and it also allows Jumbo to accept more orders and to offer more time slots to the customers (Retailtrends, 2018).

Some information is also elicited from observations during a seven hours workday of helping a deliverer of Albert Heijn on the job or are retrieved from informal interviews with the operational workers met during the day. The groceries of Albert Heijn will be delivered from the suppliers to the distribution centers. From these, the groceries will then be packed in crates, cooler boxes or ice boxes and then sent to the hubs, or load in delivery vehicles directly. From the hubs, the groceries will be load in the delivery vehicles and then be sent to the customers. At every customer, the products must be collected from the different boxes. After delivering all the orders, the deliverer will return to the distribution center or the hub and then the empty boxes will be brought out the vehicle and a new order will be loaded if needed by fillers. There will also be team leaders to set up and evaluate the trips. Besides, there is also a help center in case the deliverer needs help during the delivery. Other problems can be discussed with either their team leader or an agent who hires and guide deliverers.

#### *4.1.2.2 Pure player grocery retailers in the Netherlands*

Many start-ups have entered the online grocery markets as pure players, companies that only have an online web shop and no physical store. These start-ups diver in size and successfulness. A small start-up with less than 1000 customers is for example Pieter Pot that delivers and sell non-perishable products in sustainable preserving jars that can be taken back, washed and then re-used, which means that no plastic is involved (Keswiel, 2019). On the other hand, the local start-up Crisp and Verstaxi.nl

only focusses on delivering fresh products from local fresh grocery providers e.g. bakers and butchers (Ecommerce News, 2019b & Ecommerce News, 2019c). In February 2018, an app-based startup called Stockon also joined the market as a pure player that focused on subscription commerce in which customers could get groceries delivery every two weeks (Ecommerce News, 2019a). They offered a minimum order price of 25 euros and no delivery costs. By not choosing a preferred time slot, but only a day, the customer even received 2 euros discount on the order. They first only delivered non-perishable products, later also added fresh products to their assortments (Batten, 2019). The groceries were directly delivered from the suppliers to the customers via logistics service provider PostNL that already operates, instead of using own vehicles in order to reduce CO<sub>2</sub> emissions (Fonkonline.nl, 2018) However, the company could not get enough media attention and was also unable to find external investors that has led to the end of Stockon in 2019 (Ecommerce News, 2019a).

From all the pure player start-ups, Picnic might be the most successful. As can be seen in figure 6, Picnic is one of the largest players in the online grocery retail market. As opposed to Jumbo and Albert Heijn, Picnic is a pure player that gets the groceries from grocery retailer Boni, that is also part of Superunie (Voermans, 2018). Picnic only focusses on online grocery shopping and does not have physical stores, which allows them to have a minimum order price of 25 euros and no delivery costs for the customers (Ries, 2018). Another reason is that the deliverers follow a fixed efficient route that has been predetermined by an algorithm. However, since Picnic uses electric vehicles with a maximum speed of 45 km/h to deliver, they cannot make use of all routes (Kreekel, 2016). They also try to order from suppliers as efficient as possible in order to prevent food waste e.g. order the exact number of breads at the baker the night before delivery. According to Ries (2018), Picnic has 4 distribution centers and 21 hubs in 2018. The groceries will be brought from the suppliers to the distribution center and then to the local hub to the customer. They are only active at cities that have the potential to be viable and will never take to many customers in order to provide every customer the best service. Therefore, customers will sometimes have to wait on a waiting list, before being allowed to order at Picnic. For their patience, customers will receive free products with their first order to make it up.

Besides delivering groceries, Picnic also delivers meal boxes just as Albert Heijn (Meesterburrie, 2019). These meal boxes consist of all the groceries a customer needs for a certain meal. Therefore, they are competing with other pure players that only focus on delivering meal boxes e.g. Market leader HelloFresh, Ekomenu, Marley Spoon or Chef Ali (Business Insider Nederland, 2018 & Bestemaaltijdboxen.nl, n.d.). Another pure player that might enter the Dutch market is Amazon (either AmazonPantry that deliver non-perishable products or AmazonFresh that also deliver fresh products), since they also deliver groceries in Germany and Belgium (Twinkle, 2017 & Retailtrends, 2017). However, according to ING, Amazon is not likely to do it due to low margins to buy and sell products, complex distribution and expensive labor and homedelivery services in the Netherlands (Emerce, 2018a). On the other side, Bol.com already has a logistics network in the Netherlands and Albert Heijn is thus considering selling certain products via Bol.com (Distrifood, 2019).

#### *4.1.2.3 Logistics service providers of the last mile delivery of grocery order in the Netherlands*

Some grocery retailers do not (always) deliver their own groceries but let a logistics service provider do the last mile delivery of the groceries. One of the largest logistics service providers from the Netherlands is delivery company PostNL, that delivers for more than 50 suppliers food products e.g. groceries or meal boxes (van Woensel Kooy, 2018). PostNL is obligated by law to deliver all the posts in the Netherlands and delivers 7 million letters and 800,000 parcels in the Benelux every week (Postnl, n.d.). PostNL already has a national delivery network, which could save some grocery retailer's effort to set up one or have a more efficient and sustainable urban distribution. That is why Jumbo started a

pilot to have the last mile delivery done by PostNL in Groningen (RTVNoord, 2019). Besides, Hoogvliet also collaborates with PostNL to explore the opportunities outside their own market (Twinkle, 2015). PostNL collects the products in (cooler) food boxes from the different food suppliers and then sort and distributes it via one hub in their delivery vans (Retailtrends, 2018). There is also a possibility that suppliers directly deliver groceries to customers in collaboration with partners like PostNL (Schutijser, 2019)

Besides PostNL, food delivery companies like Thuisbezorgd.nl/Takeaway.com, Deliveroo, UberEat or local delivery companies like FoodDrop or Supperbuddy play a role in the last mile delivery of online groceries. Albert Heijn not only sells meal boxes, but also sell complete warm meals in Amsterdam that will be delivered by Thuisbezorgd.nl and Deliveroo since the beginning of 2019 (Albert Heijn, 2019). Also, Albert Heijn started a pilot to deliver grocery orders within 2 hours in Rotterdam in collaboration with logistics service provider SuperBuddy in 2017-2018 (van der Linden, 2018). However, they stopped the collaboration in 2018. In the same year, the AH to GO-stores of Albert Heijn started a collaboration with Thuisbezorgd.nl in Amsterdam to deliver groceries with e-bikes (Albert Heijn, 2018). In Groningen, Jumbo started to deliver groceries within 45 minutes in collaboration with local delivery company FoodDrop (Neerman, 2019).

Lastly, some bricks-and-clicks companies, pure players and logistics service providers also take back products e.g. (beer) crates, bottles and plastic bags, in order to offer an extra service and for efficiency and sustainability reasons. Therefore, Picnic also takes back parcels that needs to be returned to web stores e.g. Wehkamp, Zalando, Bol.com and Esprit (Emerce, 2018b). For this, Picnic receives a compensation from designated web store.

## 4.2 Other relevant stakeholders of the last mile grocery delivery

In section 4.1, the most important players of the online grocery market have been mentioned. However, there are also other stakeholders that are not directly part of the market but do influence or get influenced by the last mile delivery of online grocery order (Freeman, 2010). These groups can be distinguished into categories defined by Feitelson and Salomon (2004) that determines the adoption of innovation: technology stakeholders, economic stakeholders, political stakeholders and social stakeholders. Every stakeholder group is elaborated in section 4.2.1 till section 4.2.4.

### 4.2.1 Technology stakeholders

Online grocery shopping is a technology driven business. First, all the companies must have a website or app. This means that website and app developers are very important stakeholders. For these websites and apps, certain algorithms must be developed in order to have an efficient system. Besides, these algorithms are data driven. Therefore, data analysts are also important stakeholders for companies. Furthermore, the companies also need software and apparatus for finding and showing the most efficient routes such as navigation systems and smartphones. Thus, manufactures of these apparatus are also important stakeholders. On the ordering side, devices, tablets, smartphones, or even smart refrigerators by tech companies e.g. Amazon or Samsung are important stakeholders for the online grocery deliveries (Amazon, n.d.). Besides, a lot of companies either deliver with electric vehicles or electric bikes e.g. Picnic or Thuisbezorgd.nl. Even conventional delivery vans need certain technological additions. Therefore, manufactures of vans, electric vehicles and bikes are important stakeholders, just as manufactures of the charging systems. Besides, logistic systems can also be robotized or automatized that can enhance its efficiency e.g. autonomous delivery cars or smart locks that allows deliverers to enter a house in order to put the groceries in the fridges (CustomerFirst, 2019). Thus, smart logistic companies are also important stakeholders that can influence the system.

#### 4.2.2 Economic stakeholders

Since the most important challenge for online grocery shopping is to make it cost-effective, investors are very important (Punakivi et al., 2001). Stockon for example stopped, because they couldn't find external investors (Ecommerce News, 2019a). On the other hand, recently, Picnic received a total of 250 million euros from ABN Amro, funds and other partners in order to develop a robotized distribution center in Utrecht and to continue its expansion (Pijpker, 2019). Besides, the Dutch government, European Union and private companies have collected a total amount of 87 million euros for investing in hydrogen or electric machines, infrastructure and vehicles including grocery delivery vehicles (Rijksoverheid, 2019).

#### 4.2.3 Political stakeholders

Given the expected rise in vehicle movements and the urge to improve the environment, livability, traffic safety and economy, cities across the globe face the challenge to find ways to make their urban logistics more efficient and sustainable (Cleophas et al., 2019). The Dutch government's goal is to halve the CO<sub>2</sub> emissions in 2030 compared to 1990 (Rijksoverheid, 2019). For this, innovative local and regional collaboration solutions for urban logistics must be considered (De Jong, 2019) e.g. the municipality of Delft has started a living lab in collaboration with postal company PostNL to test hubs outside city centers that collect parcels and deliver these with electric vehicles to the city centers (MRDH, 2018). This is also a reason why the Dutch government and European Union wants to invest in hydrogen or electric machines, infrastructure and vehicles including grocery delivery vehicles, is because the transport sector causes the quarter of the CO<sub>2</sub> emissions (Rijksoverheid, 2019). In order to enhance the safety and livability in certain neighborhoods, maximum speed can be decreased, smart traffic lights can help to decrease the congestions and streets can be better developed for online grocery services (Utrecht.nl, n.d.). For this municipalities, project managers and traffic managers are important stakeholders.

#### 4.2.4 Social stakeholders

The rise of online grocery shopping has enhanced the number of vehicle movements. This means that citizens might get into more congestions or get hindered by the vehicles. This must be avoided by the grocery retailers as much as possible in order to have a good image. For complaints or either issues, customer service must be provided. Therefore, this stakeholder group is very important. Besides, online grocery retailers also need to know more about the customer behaviors. Therefore, customer panels as customer data analysts are very important. Besides, online grocery delivery can play an important role in lowering the food waste. Now, food that are almost spoiled are given away to food banks or will be sold in physical stores with discounts (NOS, 2019).

### 4.3 Objectives of key stakeholders in the last mile delivery of online grocery shopping

Section 4.3.1 focusses on the group of interviewees that can reveal or represent the objectives of the most important last mile delivery stakeholder for the viability of online grocery shopping. The selected group of stakeholders that needs to be involved in the decision-making process and the objectives of these stakeholders are presented in section 4.3.2.

#### 4.3.1 Selected stakeholders and experts

According to the stakeholder analysis of chapter 4 and the business models of Albert Heijn, Jumbo and Picnic in section 5.1, many stakeholders can be involved in the decision-making process to identify the success and failure factors to analyze the viability of online grocery shopping in the Netherlands. The ideal situation would be if all these parties could be involved. However, due to time and network constraint, not all the parties can be interviewed. Therefore, after a meeting with a supervisor of the

TU Delft and a supervisor from Accenture, the following type of stakeholders and experts were interviewed:

- Accenture experts (AE)
- Customer perspectives represented by Accenture experts (CPAE)
- Grocery retailers (GR) are bricks-and-clicks companies and pure players that are responsible for online grocery shopping activities
- (Governmental) civil servants (CS)
- Delivery companies (DC) that provide the last mile delivery
- Operational employees (OE)
- Independent researchers (IR)
- Customer perspectives represented by independent researcher (CPIR)

Every stakeholder and expert are also defined by an abbreviation. These interviewees were identified due to their knowledge, expertise and interest in the last mile delivery of online groceries. An overview of the interviewees, their functions and interview date, is given in table 5. The approaching strategy that has led to this list of interviewees is described in appendix B.

**Table 5.** Overview of interviewed stakeholders with their functions and meeting dates

	Type of stakeholder	Function	Date of interview
1.	CPAE	Principal director at Accenture strategy (SC focus)	29-10-2019
2.	CPAE	Senior manager mobility	30-10-2019
3.	OE	Deliverer	31-10-2019
4.	CPIR	Lector cities and logistics	4-11-2019
5.	GR	Strategy Director	5-11-2019
6.	CPAE	Manger Director Retail consulting and customer experience	8-11-2019
7.	CPAE	Supply chain & Operations strategy manager	8-11-2019
8.	GR	Growth Analyst	8-11-2019
9.	CS	Project manager Logistics & Smart mobility	12-11-2019
10.	GR	Supply chain analyst	13-11-2019
11.	CPAE	Business strategy consultant	15-11-2019
12.	GR	Manager online operations	18-11-2019
13.	OE	Human Resource Agent	18-11-2019
14.	OE	Team leader delivery	18-11-2019
15.	DC	Product Owner Food	20-11-2019
16.	IR	Assistant professor sustainable logistics	28-11-2019

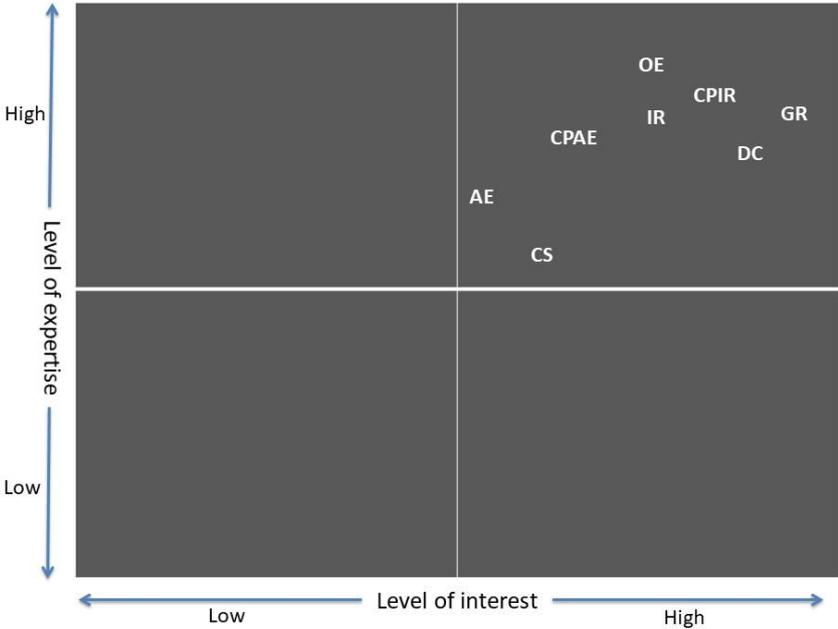
As defined by Freeman (2010), a stakeholder is an individual or group of individuals that are influenced by or can influence the achievement of objectives of organizations. The positions of the interviewees in table 5 relative to each other based on the level of interest and expertise are given in figure 7. The delivery companies and the (bricks-and-clicks and pure player) grocery retailers have the highest interest, since they are competing each other in the market. It is quite remarkable that the operational employees have the highest expertise on the last mile delivery on online grocery shopping and the civil servants the lowest, since the operational employees usually have the lowest decision-making power and the civil servants the highest. This is because operational employees are confronted with all types

of problems and patterns in the last mile delivery of online groceries, while the civil servants have a broad view on all kind of different subjects. It is important to notice that civil servants are not directly related to the market of online grocery shopping (See section 4.1). However, the business models of the grocery retailers must comply with the public policy.

Furthermore, Accenture experts and independent researchers can influence the system by providing expertise and their opinions in the field. Based on their interests in the field, some of them are also customers of online grocery services. Therefore, some also represent the customers perspective during the interviews. These stakeholder groups have a higher interest and level of expertise compared to experts who do not use the service themselves. However, this might have implications for the results, since most of the customers are not experts in retail and thus have different points of views. The reason to interview experts instead of random customers, is because experts have more experience in analyzing success and failure factors for the viability of online grocery shopping in the Netherlands.

The main difference between these stakeholder groups is that the independent researchers also have academic expertise on the topics, as opposed to Accenture experts. Besides, as can be seen in figure 7, the independent researchers also have more interest in the topic due to the societal and politic challenges as mentioned in the chapter 1. Besides, Accenture consultants are usually more profit driven compared to academics. These differences of consultants and academics makes it crucial to distinguish these groups.

Besides, 5 out of 16 interviewees are Accenture experts (See table 5). The reason to involve so many Accenture experts compared to other stakeholder groups is because it is difficult to plan an interview with other stakeholder groups due to the lack of network, confidential information and time constraints. The second-best option is to use the expertise of Accenture experts, since they have been doing many projects for grocery retailers and delivery companies. Besides the fact that some Accenture experts are customers, they do not know exactly what the objectives are of the grocery retailers or other stakeholders. Therefore, it is very important to have a final validation of the results with a grocery retailer and an independent researcher.



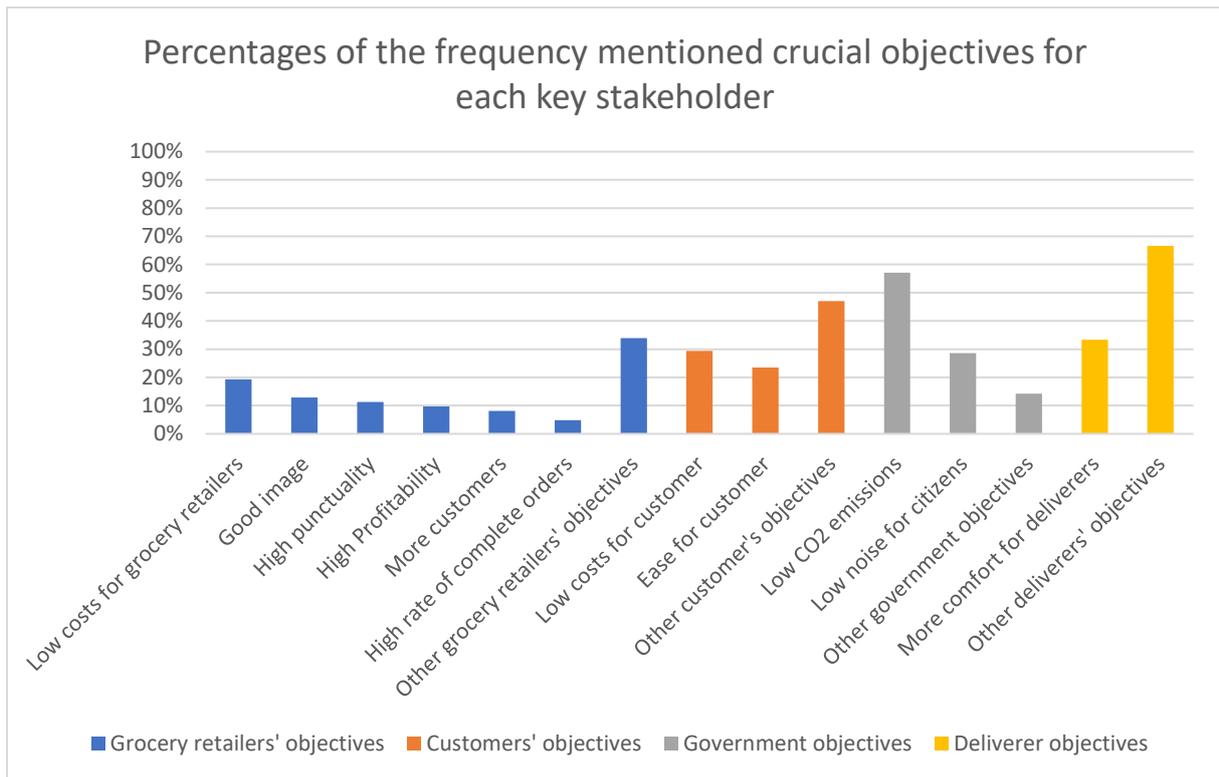
**Figure 7.** Expertise-interest diagram of last mile online grocery delivery

#### 4.3.2 Objectives of key stakeholders and their weights

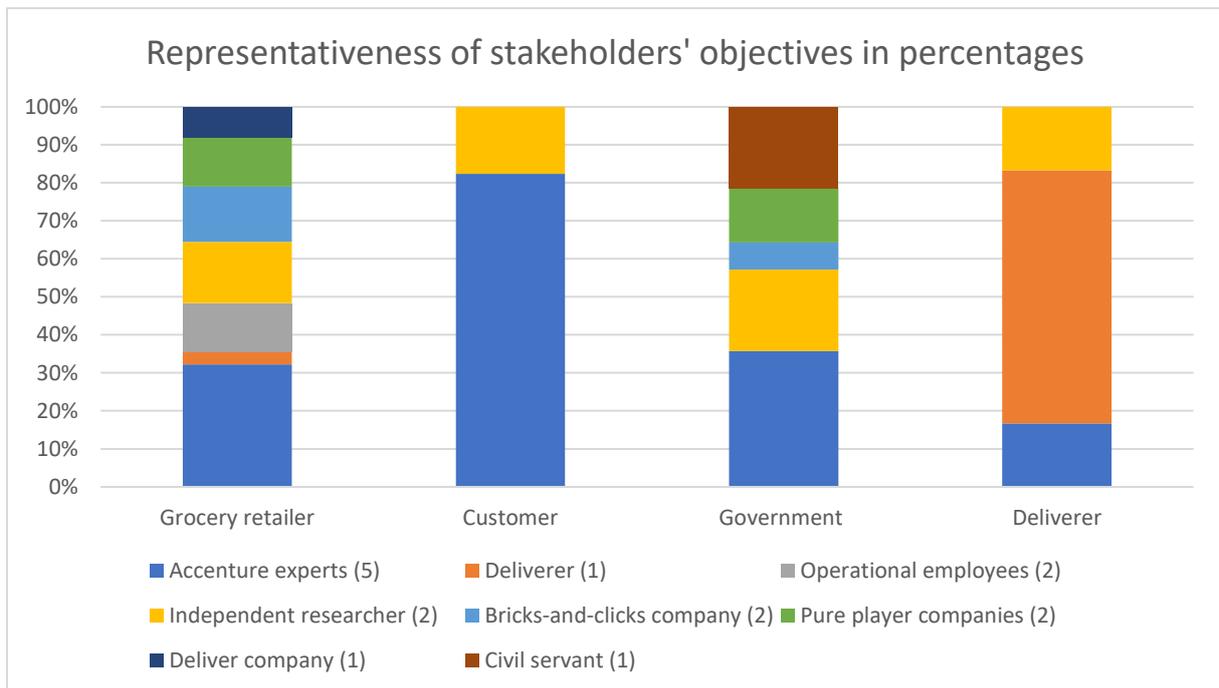
Based on interviews with Accenture experts and independent researchers, four key stakeholders have been identified which objectives must be involved in the evaluation process. The first one is the perspectives from (both bricks-and-clicks and pure players) grocery retailers that provide the online grocery shopping service. The second group are the customers. This group is important since it directly impacts the objectives of the grocery retailers. The third group consists of deliverers. The performance of this group is very important for how customers perceive the customer service level and the cost-effectiveness for the last mile delivery of grocery retailers. The objectives of the delivery companies concerning the last mile delivery of groceries overlap with this group and the group of grocery retailers that also strives for an efficient last mile delivery. Even though more profit for delivery companies will most likely lead to more costs for grocery retailers, they both strive for more profit and less costs. Therefore, this stakeholder group is not specifically mentioned in the evaluation process. The last group consists of the objectives of the government. The Dutch government has many objectives and issues that needs to be taken into consideration. For this thesis, the government represents the objectives of other citizens that are impacted by the last mile delivery. These government objectives concerning city logistics are also taken into consideration by grocery retailers and thus should be involved in the evaluation process. The main question that has been asked to the interviewees to retrieve the stakeholders' objectives is:

*“which objectives should be achieved in order to have a successful last mile delivery system of online groceries?”*

The most important objectives of each stakeholder group are presented in figure 8. The percentages are given among each stakeholder groups' objectives and define how often an objective has been mentioned by a certain interviewee group compared to other objectives. In figure 9, the representativeness of the results is given per stakeholder group. This figure shows the distribution of the number of objectives mentioned by a certain interviewee group for every stakeholder group. The number of interviewees that took part are mentioned next to the interviewee group. For the selection procedure, the distribution per objective and more detailed description of every objective, see appendix E.



**Figure 8.** Distribution of the most crucial objectives retrieved from the interviews



**Figure 9.** Distribution of the representativeness of the stakeholders' objectives by interviewee groups

First, the objectives of the grocery retailers are discussed. As can be seen in figure 8, the following objectives have been identified as the most important grocery retailers' objectives: 1. Low costs for grocery retailers, 2. Good image, 3. High punctuality, 4. High profitability, 5. More customers and 6. A high rate of complete orders. As can be seen in figure 9, all the interviewees (except for the civil

servant) have mentioned certain objectives that are important for grocery retailers. However, less than 30% of the mentioned grocery retailers' objectives were retrieved from interviews with either the bricks-and-clicks companies or the pure players companies. Therefore, these are validated with two bricks-and-clicks companies that confirmed that these are the most important objectives besides the fact that they both used other KPI's or descriptions for reaching the same objectives. Furthermore, it is remarkable that the objective "low costs" was mentioned more often than the objective "high profitability", since the main objective of a company is to make profit, which can be achieved by cost savings (de Haan & de Heer, 2012). This is explained since the cost-effectiveness is the largest challenge in the last mile delivery of online groceries (Punakivi et al., 2001). The same argumentation can be used to explain why the objective "more customers" is almost as important as the objective "high profitability". According to researches by Amit & Zott (2011), Rappa (2004) and Bouwman & MacInnes (2006), scalability is the key factor for the success of these internet-based business models. Thus, for achieving a successful online grocery business, other objectives also play a crucial role.

Second, the objectives of the customers are discussed. The most important customers' objectives for a successful last mile delivery system of online groceries are: 1. Low costs for customers, and 2. Ease for customers. These two objectives together were mentioned more than 50% of the customer objectives (See figure 8). The reason why not many other objectives have been included, is because many can be associated with ease for customers e.g. time savings is also an important objective, but according to Raijas & Tuunainen (2001), components of time saving are ease of ordering and ease of finding products. These two objectives have also been validated by an independent researcher with customer perspectives. However, it is very important to notice that the number of objectives is smaller than the number of grocery retailers (2 compared to 6). This might have implications for the representativeness of the stakeholders in the evaluation process, as these objectives are used as criteria to score the effectiveness of the solutions (See chapter 6). However, objectives such as completeness of the order, punctuality and ordering online groceries at a company with a good image are also beneficial for customers. Therefore, this does not have problems with acceptability of the solutions by the customers based on the representativeness of the objectives. What might have implications is the fact that the list of objectives is based on the point of view of only independent researchers and Accenture experts with customer perspectives (See figure 9). This is not representative for the Netherlands e.g. they have more expertise in the field, (probably) have a higher income than the average Dutch citizen and live in the "Randstad", which excludes the Dutch rural areas.

Thirdly, the objectives of the government are discussed. As presented in figure 8, the most important government objectives are: 1. Low CO<sub>2</sub> emissions, and 2. Low noise for citizens. These two objectives represent more than 80% of the mentioned government objectives. Especially, the objective "low CO<sub>2</sub> emissions" have been mentioned relatively a lot. This might be the result of the Dutch government's goal to halve the CO<sub>2</sub> emissions in 2030 compared to 1990 (Rijksoverheid, 2019). Other objectives have been excluded, which might cause the same problem for representativeness in the evaluation process as for the customers. However, also for the government objectives that are societal objectives e.g. low CO<sub>2</sub> emissions, low noise, high safety level, these are represented by the grocery retailers' objective of having a good image. Besides, for achieving low costs, the process must be more efficient, which can lead to a more sustainable last mile delivery. Looking at figure 9, only 21% of the mentioned objectives were obtained from a governmental civil servant. This is the same percentage as the bricks-and-clicks and the pure player companies combined. The other percentages were mentioned by Accenture experts and independent researchers (with customer perspectives). This means that it has been confirmed that both grocery retailers and customers also want to achieve the societal objectives. Besides, the selected two objectives have also been mentioned by the civil servant what can be used

as a validation. However, by interviewing more than one governmental civil servant, more information could have been retrieved from the government perspectives. This result is also not representative due to the low number of interviews.

Lastly, the objectives of the deliverer are discussed. As can be seen in figure 8, only one objective has been elicited as crucial for the viability of the last mile delivery of online groceries: More comfort for deliverers. As the deliverer is an employee for the grocery retailer, he or she shares some objectives with the grocery retailer such as high punctuality and a good image. A point for discussion is that salary has also been mentioned as an objective, since money is the main driver for most of the employees to deliver. However, collective agreements on salary will make it difficult to enhance this. Besides, it is not a daily objective of the deliverer to enhance its salary. This has been validated by a deliverer, that also mentioned that the salary is already good for deliverers due to the high responsibility that is involved. An implication is that only one deliverer has been interviewed and less input from Accenture experts and independent researchers have been gathered (See figure 9). Therefore, the results are not representative for all the deliverers in the Netherlands. For every deliverer, the situation is different due to reasons such as the company they are working for, experience, gender, the vehicle they are driving in and the salary they have.

#### 4.4 Summary and discussion of most important objectives and their weights

The analysis on the demand side of the online grocery market has shown that the number of Dutch citizens that do online grocery shopping will grow. There are different socio-cultural needs that either are fulfilled by the online grocery channel or by remaining to shop in the physical stores. These needs must be fulfilled or used to build a successful business model by the bricks-and-clicks companies, the pure player companies or the logistics service providers. From these parties, Albert Heijn, Picnic and Jumbo are the most successful given a market share of almost 90%. From this analysis, it becomes clear that online grocery shopping not only focus on the delivery of groceries, but also provides an even broader customer service by e.g. offering return policies, recipes and meal boxes. The logistics service providers such as PostNL and Thuisbezorgd.nl offer grocery retailers the opportunity to deliver groceries or meals with their established logistics network. The total online grocery shopping market can only be established due to technological stakeholders e.g. web developers, data scientists and electric vehicles manufactures, and economic stakeholders e.g. private and public investors. As certain companies switch to electric vehicles that cause less noise, it is also important to help achieving objectives of the political stakeholders e.g. less CO<sub>2</sub> emissions and to not disturb other citizens by e.g. blocking the streets. However, not all the stakeholders can be involved in the evaluation process. Semi-structured interviews with experts has revealed that grocery retailers, customers, government and deliverer objectives are the most crucial ones to involve in the evaluation process of the last mile of online grocery delivery.

The most important stakeholders' objectives are weighted by an independent researcher with customer perspectives and a bricks-and-clicks company (See appendix K for results). An overview of these objectives and the scores assigned to every objective are presented in table 6. The weights are assigned based on a 5-point Likert Scale (1=unimportant, 2=slightly important, 3=moderately important, 4=important and 5=very important).

**Table 6.** Overview of most important stakeholders' objectives and their assigned weights

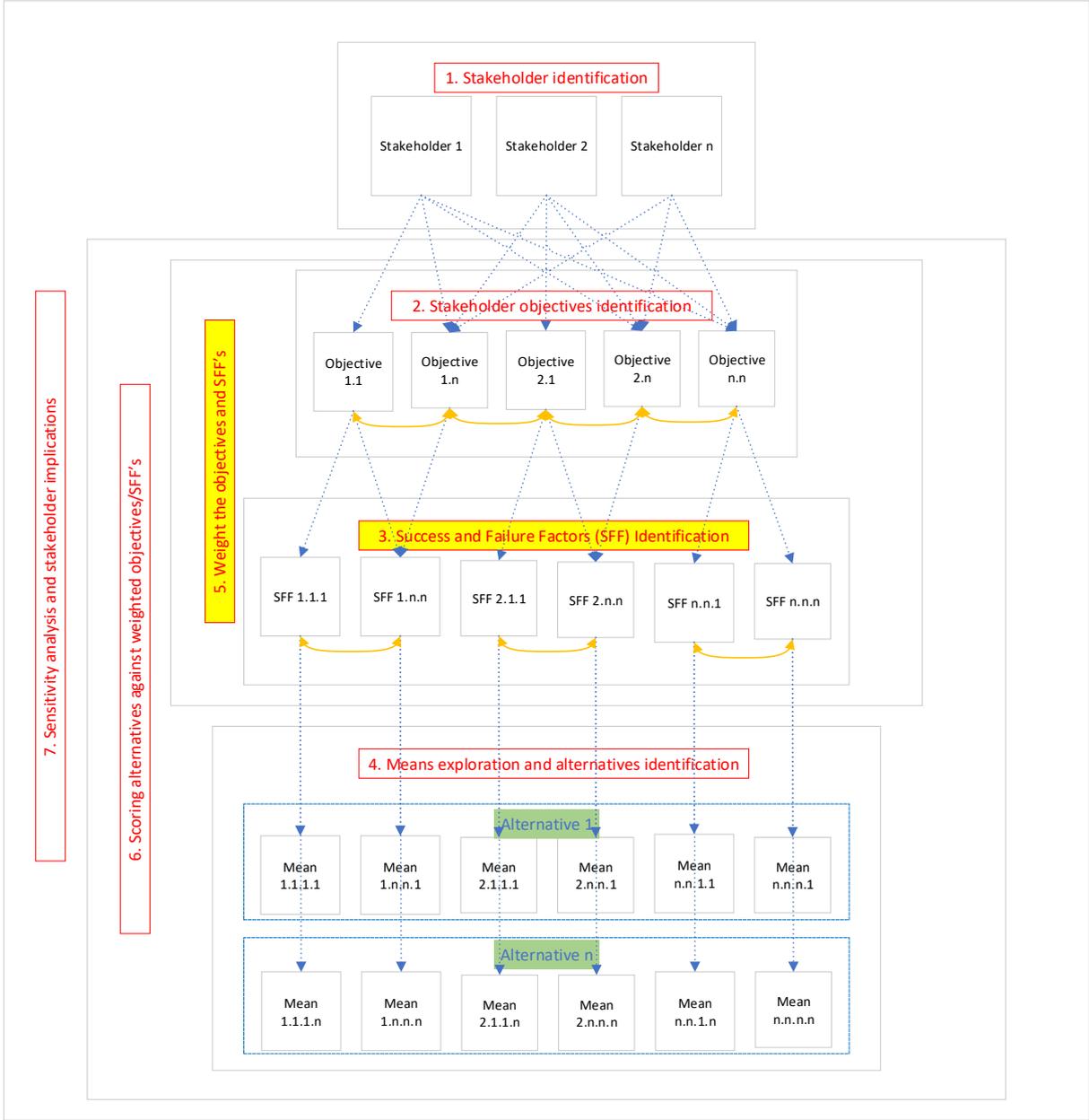
Stakeholder		Objective	Weights according to one Independent researcher with customer perspective	Weights according to one bricks-and-clicks company
Grocery retailer	1.	Low costs for grocery retailers	5	5
	2.	Good image	4	5
	3.	High punctuality	5	5
	4.	High profitability	4	5
	5.	More customers	5	5
	6.	High rate of complete orders	5	5
Customer	7.	Low costs for customers	5	4
	8.	Ease for customers	5	4
Government	9.	Low CO <sub>2</sub> emissions	1	4
	10.	Low noise for citizens	1	4
Deliverer	11.	More comfort for deliverers	5	4

The independent researcher has assigned “4” or “5” to all the objectives, except for the government objectives. The reason why CO<sub>2</sub> emission is not an issue for the researcher is because most of the grocery retailers already use or will use electric vehicles. Besides, the citizens are already used of the noise of delivery vehicles, which means that it is already accepted and therefore should not be reduced. However, the results have also been validated by the governmental civil servant and an Accenture expert. They argue that the problems are still faced by the Dutch government, which should therefore be involved. Besides, the bricks-and-clicks company assigned the highest score “5” to their own objectives and “4” to the other stakeholders' objectives, which is very logical from the point of view of a grocery retailer. This also means that the bricks-and-clicks company do think all the other objectives are important. These weights can be used for evaluating the alternatives in chapter 6.

However, it should be noted that the weights might not be very reliable, since direct rating has been applied. The bricks-and-clicks company could for example have preferred a certain objective more than another. As can be seen in figure 8, low cost has been mentioned most often, that might indicate there is indeed a difference in priority. As opposed to direct rating, pairwise comparison methods such as Analytic Hierarchy Process (AHP) or Best Worst Method (BWM) could have revealed a certain ranking among the objectives (Baudry, et al., 2014; Rezaei, 2015a and Rezaei, 2015b). From these two methods, the BWM stands out for its simplicity and reliability by only using two vectors of pairwise comparisons (Rezaei, 2015a). However, due to time constraint, the results of direct rating are used for further evaluation. Besides, it is important to notice that 2 stakeholders are not representative for all the customers and grocery retailers. This is also not representative for all the stakeholders. The main reason to include only 2 stakeholders is because of time constraint. Therefore, the results should not be used as objective data, but rather as subject of discussion and to create a certain point of view. Besides, it can also be used for a certain validation of the results. Due to the unreliable results of the method used and the low number of interviewees, it is important to perform a sensitivity analysis in chapter 6.

# 5. Analysis of the success and failure factors of online grocery delivery

The fifth chapter focusses on the third and fifth step of the MAMSSFMCA (the steps in yellow in figure 10).



**Figure 10.** Steps of the MAMSSFMCA for the analysis of success and failure factors of online grocery delivery

This answers the third sub question:” What are the most important success and failure factors of the current Dutch last mile delivery concepts of online groceries from the perspectives of different stakeholders?” For identifying success and failure factors, experts and stakeholders have been interviewed. These interviews were mostly focused on the online grocery shopping concepts of the largest players in the Netherlands Albert Heijn, Jumbo and Picnic. Due to time constraint, only these concepts are mapped and compared in section 5.1 based on information from their websites and apps. The reason why the focus has been on these parties, is because most of the interviewees are customers

at one or more of these three grocery retailers. They are exemplary for other grocery retailers in the Netherlands because of their success of having almost 90% of the market share (de Best, 2019). In section 5.2, results of the interviews are presented, focusing on the success and failure factors of the current Dutch online grocery shopping systems. From these success and failure factors, a selection has been made, based on key questions derived from the results. These key questions and success and failure factors has been weighted on how important they are for the viability of online grocery shopping in the Netherlands. This is presented in section 5.3. In section 5.4, the findings from the different research methods are summarized.

## 5.1 Comparison of the current online business models of Albert Heijn, Jumbo and Picnic

The comparison of the business models of Albert Heijn, Jumbo and Picnic are based on information retrieved from their websites and apps (AH, n.d.; Jumbo, n.d. and Picnic, n.d.). These business models are categorized as followed: website and app, price and payment differences, assortments and products offered and delivery service. The comparisons per category are made in section 5.1.1 till section 5.1.4.

It seems like that Albert Heijn and Jumbo must provide a more customer friendly delivery e.g. more time slots, bigger assortment, delivery to the kitchen, take back beer crates and not having a waiting list. However, the main benefit is that their brand is already known by the customers. On the other hand, Picnic might become more popular due to this exclusivity or the trendy image they have due to the “real life” tracker and the opportunity to pay via IDEAL. Picnic also require a lower minimum order price and no delivery costs.

### 5.1.1 Website and app

The functions related to the website and app are compared in table 7. Picnic only offers the customer the opportunity to order via its app, while Albert Heijn and Jumbo also allow their customers to order via their websites. Picnic distinguishes itself by having a “real time” track & trace service in which the vehicle’s location can be followed. However, due to privacy issues, the track & trace service is not real time, but the location of the vehicle has been forecasted at every given moment of time of the route. Therefore, it appears that the vehicle has been arrived according to the app, but e.g. is delayed for more than 10 minutes. Nevertheless, this might attract many customers to use the app. Besides, what might be key for the profitability of Picnic is that they introduced a waiting list. They will only allow them to order if it will be profitable for Picnic to deliver and will provide free products to make up with the customer. However, looking at the numbers of downloads, Albert Heijn is still front runner. This might be due to the configuration with Bol.com, which is just as Albert Heijn part of Ahold Delhaize. This might explain why they are still front runner. Lastly, Jumbo seems to have the most personal service by having filter functions with dietaries and allergies and letting the users write a personal message about what the deliverer must know about the family or the house before delivering.

**Table 7.** Comparison of the functions related to the website and app of Albert Heijn, Jumbo and Picnic

<b>Website/app</b>	<b>Albert Heijn</b>	<b>Jumbo</b>	<b>Picnic</b>
<i>Order at website</i>	x	x	
<b>Order at app</b>	x	x	x
<i>App downloads on Android</i>	1 million +	500,000 +	500,000+
<b>Track &amp; Trace predicted arrival time slot message</b>	30 min		20 min
<i>Track &amp; Trace Service</i>	Adjustment of arrival time slot message	10 minutes before arrival message	Real time track & trace after leaving hub
<b>Subscribe on the grocery retail service</b>	"Bezorgbundel" - No delivery costs - Minimum delivery price is always 50 euros		
<i>Registering distinctions</i>	Bol.com account can be used	Description of personal delivery service can be given	Information about the household will be asked
<i>Filter function for dietaries and allergies groceries</i>		x	
<b>Sort function for selecting groceries</b>		x	
<i>Waitlist and free products</i>			x

### 5.1.2 Price and paying procedure

The prices and payment procedures of Picnic, Alber Heijn and Jumbo are compared in table 8. Picnic is the most attractive for customers due to lowest minimum order price and no delivery costs. Besides, Picnic is also the only one that let their customers pay via IDEAL. This reduces the delivery time at the door of the customer. However, Albert Heijn and Jumbo can add or reduce the returned crates and bottles from the receipt immediately, saving administration costs that Picnic does face by transferring money for returned bottles. On the other hand, Albert Heijn and Jumbo also make administration costs if they must take direct credit from the customer's account if the customer is not able to pay at the door e.g. no service of the mobile pin machine. However, only Jumbo offers the opportunity to pay with credit card, which might be more expensive.

**Table 8.** Comparison of the prices and payment differences between Albert Heijn, Jumbo and Picnic

<b>Price/paying</b>	<b>Albert Heijn</b>	<b>Jumbo</b>	<b>Picnic</b>
<i>Minimum order price</i>	50/70	50	25
<b>Delivery costs</b>	0-12.95 euro	0-6 euros	0
<i>Pay online after ordering via IDEAL</i>			x
<b>Pay at the door with Maestro</b>	x	x	
<i>Pay at the door with Credit card</i>		x	
<b>Pay at the door with QR code</b>	x		
<i>Pay after delivery by direct debit taken from your account</i>	x	x	x
<b>Variable price between ordering price and actual price</b>	x	x	
<i>Plastic packaging price</i>	5 eurocents		
<b>Deposit plastic back/delivery crate</b>	4 euros for a delivery crate	5 euros for a delivery crate and 0.05 euros per plastic back	0.35 euros for recyclable plastic backs
<b>Transfer deposit to bank account</b>			x
<i>Deposit calculated on the receipt</i>	x	x	
<b>Discount for not changing/adding anything after placing the order</b>		x	

### 5.1.3 Assortment and products

The assortments and products offered are compared in table 9. Picnic challenges Jumbo with their own concept of offering products for the lowest price. However, Picnic does have the smallest assortment. Co-founder of Picnic Michiel Muller argues that this will lead to lower order picking time and a faster ordering process for the customer due to less choices, which are both beneficial (Emerce, 2017). Albert Heijn on the other hand, offers products from Etos and Gall & Gall, which is a benefit for ordering at Albert Heijn online. Besides, Albert Heijn also has more data, due to the use of the discount card. One of the main benefits might be that Albert Heijn has the most recipes, which is an added value to the Albert Heijn app. This could explain the number of downloads in table 5. From these recipes, ingredients can directly be ordered. A challenge for all parties might be that the customer can't choose their own products anymore, which could lead to dissatisfaction with either the expiration date or the freshness of the product. Besides, both Albert Heijn (14% market share) and Picnic has started offering meal boxes to compete with actors such as HelloFresh (70% market share), Marley Spoon, Mathijs Maaltijdbox, Streekbox and Veganbox (van Dorp, 2019). However, this is another market, which will not be analyzed in detail, but it is important for analyzing the growth of delivering online groceries from Albert Heijn and Picnic.

**Table 9.** Comparison of the offered assortment and products by Albert Heijn, Jumbo and Picnic

<b>Assortment/products</b>	<b>Albert Heijn</b>	<b>Jumbo</b>	<b>Picnic</b>
<i>Free delivery by buying certain number of discounted products</i>	x	x	Always free
<b>Assortments size</b>	Around 22,000 + drugstore Etos and liquor store Gall & Gall	Around 32,000	Around 10,000
<i>Recommendations of products based on</i>	Discount card with the bought articles in physical store and online store	Bought articles in online store	Bought articles in online store
<b>Minimum expiration date</b>	1-4 days	1 or 2 days	
<i>Methods to remain fresh products</i>	Cooler/freezer boxes for delivery	Cooler/freezer boxes for delivery	Cooler/freezer boxes for delivery
<b>Lowest price guarantees</b>		x	x
<i>Money back for bad products</i>	x	x	x
<b>Number of recipes</b>	18,145	4216	26
<b>Meal boxes</b>	x		x

#### 5.1.4 Delivery service

As can be seen in table 10, Picnic already uses only electric vehicles for the deliveries, which causes an advantage in the areas that focus on reducing the emissions and noise. Furthermore, Albert Heijn and Jumbo both do not deliver on Sunday. Besides, Picnic can make more efficient routes by forcing the customers to choose from 1 timeslot. This might be inflexible for customer. What is also remarkable is that Picnic does not necessary deliver to the kitchen of customers, which saves them time. They also do not take back beer crates, but they do take back all the online ordered packages. Besides, they do not offer a pick-up service. This all means that Albert Heijn and Jumbo are more flexible for their customers. It is also remarkable that Jumbo still delivers from their stores. This might lead to not fully occupied trucks, which could be unprofitable. Therefore, Jumbo is shifting from doing the last mile delivery from stores to hubs (Retailtrends, 2018).

**Table 10.** Comparison of the delivery service between Albert Heijn, Jumbo and Picnic.

<b>Delivery service</b>	<b>Albert Heijn</b>	<b>Jumbo</b>	<b>Picnic</b>
<i>Groceries to the kitchen</i>	x	x	
<b>Groceries day after ordering delivered</b>	x	x	x
<i>Grocery delivery 7 days a week</i>	Not on Sunday	Not on Sunday	yes
<b>Number of time slots</b>	15	3	1
<i>Time slot range (in most areas)</i>	7 am till 10:30 pm	10 am till 9 pm	Based on the delivery time in the neighborhood
<b>Electric delivery vehicles/conventional delivery trucks</b>	25 electric delivery vehicles and 375 conventional delivery trucks	150 conventional delivery trucks and introducing electric Street Scooters	800 Electric vehicles
<i>Take back bottles and beer crates with deposit</i>	x	x	x (No beer crates)
<i>Return policy packages</i>			x
<i>Pick-up service in store</i>	x	x	
<b>Delivery from physical store</b>	From AH to Go shops	x	

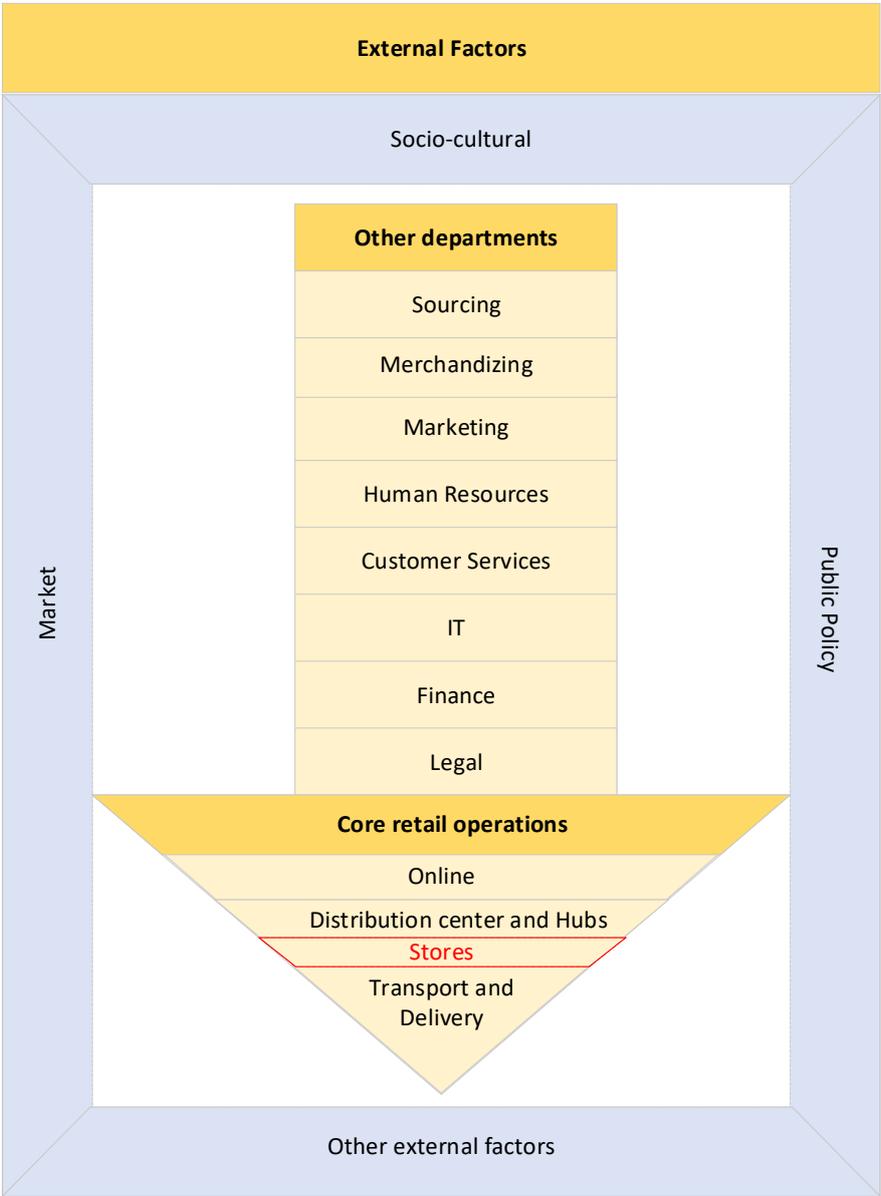
## 5.2 Identified success and failure factors of online grocery shopping in the Netherlands

In section 5.1, the current business models of Albert Heijn, Jumbo and Picnic have been analyzed. However, what are the most important success and failure factors of these models? Section 5.2.1 focusses on a new model developed by the researcher with the expertise of an Accenture consultant. This concerns factors related to the most important departments within an online grocery shopping company e.g. IT and finance, the core online and offline operations and the external factors. Section 5.2.2 then focusses on the analysis of the success and failure factors of the interviews with stakeholders and experts. This leads to 4 key questions: 1. How do we build scale? 2. How do we keep the customers satisfied? 3. How can the (new) addresses be reached in an efficient and sustainable way? 4. How can the delivery at the customers' place be more efficient? From these, five success and failure factors per key questions has been identified. These factors and key questions are then scored by bricks-and-clicks companies and experts on how important they are for the viability of online grocery shopping in the Netherlands. These results are presented in section 5.2.3.

### 5.2.1 Explorative framework for analyzing success and failure factors in online grocery shopping

As discussed in section 2.1, the Political Economy Framework of Feitelson & Salomon (2004) is suitable for analyzing the adoption of innovations given the social, technological, political and economic feasibility. However, this might not be suitable for analyzing the key factors e.g. related to the scalability of business models, which is crucial for the success of the online grocery retailers. The explorative model of business model scalability by Stampfl et al. (2013) is suitable for analyzing the factors that influence the success or failure of web-based business model innovations. However,

Stampfl et al. (2013) argued that also other factors besides scalability can lead to a successful business model innovation e.g. environmental conditions of the business model. Besides, both the models of Feitelson & Salomon (2004) and Stampfl et al. (2013) do not specifically focus on factors related to the last mile delivery of online grocery shopping. Therefore, it is important to develop a framework that is suitable for categorizing the success and failure factors in the online grocery shopping in the Netherlands. This framework has been developed with an Accenture expert (See figure 11). The Accenture expert determined the most important categories and validated the three pillars that are determined by the researcher: 1. Core retail operations 2. Other departments and 3. external factors. Besides, the researcher designed figure 11 with the shape of an arrow and the boxes around the arrow. The arrow represents the fact that the other departments supports the core retail operations. in the end, it all leads to the transport and delivery, since that is the scope of this research. The boxes around the arrow determines all the external factors. The three pillars and the associated categories are explained in more detail in sections 5.2.1.1-5.2.1.3.



**Figure 11.** Framework to categorize the success and failure factors of online grocery shopping

#### *5.2.1.1 Core retail operations*

The core retail operations consist of online, distribution centers, hubs, stores, transport and delivery. Factors related to doing online grocery shopping belongs to this category. These factors can vary between apps and website related factors (See section 5.1.1) to delivery services that are offered online e.g. the number of time slots or the online communication with the customer (See section 5.1.4). The online groceries are received from wholesalers or manufactures at the distribution center and hubs of the grocery retailer. Here, groceries are stored, picked, handled to other vehicles to deliver it to the customers. However, bricks-and-clicks grocery retailers also have a store from which they can operate, benefit from or that makes the online grocery shopping system more complex. In table 10, both Jumbo and Albert Heijn still operate from stores. However, Pure players do not have a physical store. Therefore, this category is red in figure 11. From either the physical store or the hubs, the groceries will be delivered in different kind of transport modes to the customer. In this category, factors directly related to the last mile delivery will be involved.

#### *5.2.1.2 Other departments*

The other departments enable the core retail operations e.g. by providing IT support or investments. This pillar consists of sourcing, merchandizing, marketing, human resources, customer services, IT, finance and legal. These departments are almost the same as the departments of Albert Heijn: IT, finance, real estate & construction, E-commerce, human resources, merchandizing & sourcing and legal (werk.ah, n.d.). Real estate & construction is already part of stores and e-commerce is already included as online in 5.2.1. Therefore, these are not part of the main pillars. Besides, after consulting experts from Accenture and having interviews with stakeholders, marketing and customer services also belong to important departments. Customer services are in direct contact with the customers if any problems appear or questions must be asked. This is more important for customers of online grocery shopping than customers of physical stores, due to the lack of physical contact with employees of the grocery retailer. Besides, image is very important to distinguish from other online grocery retailers. Therefore, Picnic for example have a creative and design team (Picnic, 2020). IT consists of all the data and digital technology related factors e.g. Picnic's "real time" track & trace service in which the vehicle's location can be followed (See section 5.1.1). However, this also involves legal issues concerning privacy, which is part of the legal department. Besides, everything related to the budget allocation is part of finance e.g. investments and salaries. The human resources focus on the hiring, training and satisfying of employees. Merchandizing is mainly focused on the products and assortments. This department involves the prices, promotions and quality of products (See section 5.1.3). The sourcing department forms the bridge to suppliers e.g. wholesalers and manufactures. They buy products under the best conditions for the grocery retailer.

#### *5.2.1.3 Other external factors*

The performance of a grocery retailer also relies on external factors. These are socio-cultural, market, public policy or other external factors. This complies with the four feasibility factors (technical, politic, social and economic) of Feitelson & Salomon (2004). Technical is already part of the IT department and economic part of finance. However, finance only includes internal economic factors. The market is therefore an important external factor. Besides, socio-cultural factors are also important in order to provide good customer services. Furthermore, the public policy determines what the boundaries are for the grocery retailers. An example is that grocery retailers must try to reduce their CO<sub>2</sub> emissions. Besides, there are also other external factors that cannot be categorized in any of these e.g. the weather. Therefore, a category is called "other external factors".

5.2.2 Identified success and failure factors from interviews with experts and stakeholders

The success and failure factors retrieved from the interviews with experts and stakeholders are presented in appendix F. The two main questions that has been asked to the interviewees to elicit the success and failure factors are:

1. "How were certain objectives successfully achieved and what are thus the success factors?"
2. "What are reasons why certain objectives are not achieved yet and what are thus failure factors?"

From these interviews, a total of 61 success factors and 103 failure factors have been gathered. The success and failure factors are categorized in respectively figure 12 and figure 13 based on the categories of figure 11. These figures are based on the frequency a certain success or failure factor within a category was mentioned. Thus, accumulation of the frequencies in figure 12 leads to 77 success factors and of figure 13 leads to 151 failure factors.

Most of the factors that has led to (un)successfully achieving the stakeholders' objectives are related to transport and delivery. This is especially for the failure factors, which is approximately 40% of the identified failure factors (61 out of 151). This is in line with the fact that the biggest challenge for the viability of online grocery shopping is the cost-effectiveness in the last mile of the supply chain (Punakivi et al., 2001). This result can be explained because the interviews were mainly focused on last mile delivery. However, as can be seen in figure 12, the success factors were better distributed among the categories with only approximately 20% (16 out of 77) related to transport and delivery. It is also interesting to see that two pure players barely mentioned any failure factors (3) and named more than 30% of the success factors (25 out of 77). On the other side, bricks-and-clicks companies mentioned 26 failure factors and only 4 success factors. This indicates that the viability of online grocery shopping can be enhanced by focusing on how to improve the last mile delivery of bricks-and-clicks companies.

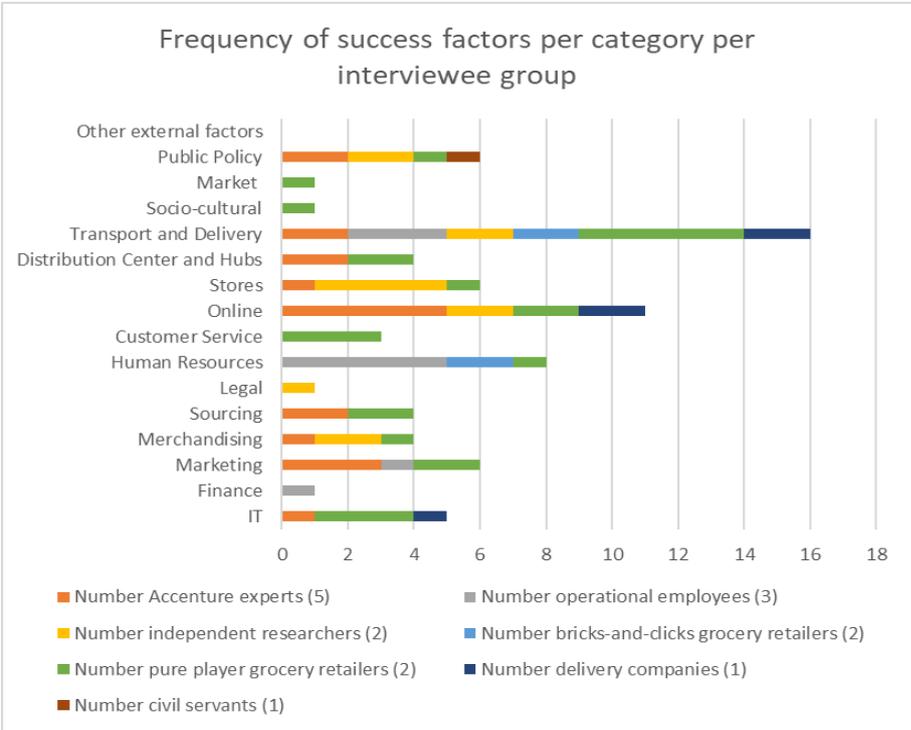
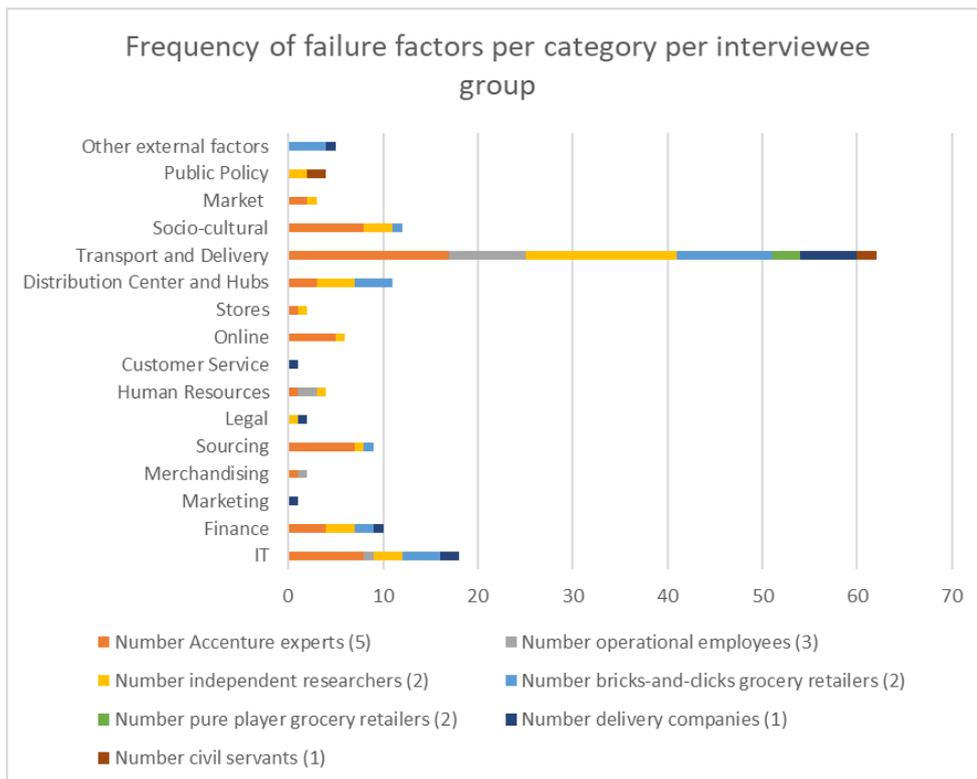


Figure 12. Frequency of categorized success factors per interviewee group



**Figure 13.** Frequency of categorized failure factors per interviewee group

The success and failure factors are analyzed together per category on the most mentioned key words (e.g. if "time spent" is mentioned in several success or failure factors, it is elaborated on), influence on objectives (See section 4.3.2.) and frequencies (number of times mentioned by different interviewees). In section 5.2.2.1, this is done for the core retail operations. In section 5.2.2.2, the other departments is analyzed. In section 5.2.2.3, the external factors are analyzed.

#### 5.2.2.1 Success and failure factors of the core retail operations

The online success and failure factors focus on the customer experience, which can enhance a company's image, and ways to make online grocery shopping more efficient, which could enhance the valuation of a company. A public champion could be crucial in this process, which is a person who believes in the viability of online grocery shopping and is driven to improve it e.g. how to achieve the optimal usage of vehicles. Efficiency can be gained if there is more time between ordering and delivery, which can also lead to an early fixed time slot notification to customers. By offering more and smaller time slots, flexibility can be offered to the customers. This flexibility factor is mentioned 3 times. Another problem mentioned is that no substitutions are offered if a product cannot be ordered online or is missed, which makes it inconvenient for users who still must go to the store then. They also must go to the store if they want to buy anything last moment or want to feel certain products e.g. fresh products. This is beneficial for the bricks-and-clicks companies who already have their loyal customers also due to the good locations.

However, a pure player won't have the costs of a physical store. They can only deliver from distribution centers or hubs, which also means that no internal competition between online and offline store can take place. One of the most mentioned failure factors (4 times) is the distance between the hubs or distribution center to the addresses of the customers which causes CO<sub>2</sub> emissions and inefficiencies. The travel distance is a trade-off between having a large or small inventory that leads to certain costs.

However, not making optimal use of the warehouses or fleet of vehicles will also lead to costs and perhaps more vehicle movements than needed. The vehicles usually return to the warehouses with no or barely load, which is due to no or barely any focus on return policy and the marginal benefits. Besides, the focus is also not on reducing CO<sub>2</sub> emissions. Companies with unsustainable diesel vehicles have a larger range and can deliver more volume. A factor that has a lot of focus is volume, which has been mentioned 4 times. More customers mean more efficient deliveries since there will be less travel time between customers and will enable more flexibilities to customers. However, this still means that the delivery process must also be more efficient. There is still a lack of actual data of (new) addresses, which leads to more time spent on finding the right address. There is also a lack of communication between the deliverer and the customer, which also can lead to a lower punctuality. Besides, the deliverers also could save time if they do not have to deliver until the kitchen, let customers pay at the door or have long conversations with talkative customers. Besides, the picking of groceries in the vehicles could also be more efficient. Another reason why deliverers might not be punctual is the lack of experience. Therefore, it is more important to offer deliverers comfort, reliable working hours, career opportunities and a decent salary. Unexperienced, unsatisfied or unhappy deliverers might have a bad attitude or makes mistakes which is bad for the grocery retailer's image. Therefore, this must be evaluated (mentioned 5 times), and trainings must be provided.

#### *5.2.2.2 Success and failure factors of the other departments*

As can be seen in figure 13, IT related failure factors are mentioned the second most (18 times). These challenges mostly focus on enhancing the ease for customers e.g. predicting right moment for customer to deliver, help customer order by offering inspiration and recommendations and better data and software to be more punctual. For this, investments are needed. Also, electric vehicles and the charging infrastructure need investments. Due to the high investment costs, electric vehicles cannot immediately be adopted by all the grocery retailers. However, this might enhance the image of a company. The advertisement on the vehicles are a large part of the marketing. Also, the first mover advantage has been identified as very crucial for a company's image. Except for attracting loyal customers. These might get convinced by offering discounts and low prices.

A real-time location of delivery vehicles can also enhance a customer's image. However, privacy must be assured. Offering good quality and local products can also enhance an image of a company. The image also depends on the fact that orders should be complete, and customers must be able to order what they usually want from the grocery store with the same conditions e.g. not too short expiration date. Otherwise, the customer service could be contacted. They also play an important role in the image of a company. Therefore, companies provide a personal customer service from the beginning with high costs, which is also caused to the lack of standardized customer service procedures.

The last and perhaps most important employees for providing a certain image are the deliverers. They should be evaluated and trained well for providing the best customer experience. For this, it is important to keep experienced workers by offering flexibilities and reliable working hours. Communication between HR and their employees is very important for this. Especially with students that work part time, the communication could be improved to keep them.

#### *5.2.2.3 Success and failure factors of the external factors*

Besides "transport and delivery" and IT, socio-cultural has been the most mentioned failure factor (12 times, see figure 13). Most of these factors are related to aspects of why customers do not prefer to do online grocery shopping e.g. they prefer doing groceries in the physical stores, they do not like to do groceries in advance, are used of a certain brand and product, want fresh products and are used of a certain price and thus do not want to pay for delivery costs. These factors are crucial for building

scale for an efficient delivery and more profit. For attracting more customers, it is important to analyze other systems including the competition that can take away part of your customers. The standards are caused by other e-commerce web shops that can provide cheap, fast and good deliveries. From these companies, a lot can be learned. All these e-commerce activities lead to more CO<sub>2</sub> emissions and noise. Companies do not have to adapt anything if the social costs are not taxed or intercepted by public parties. The government can also provide subsidies to enhance the use of electric vehicles that cause less noise. Most deliveries can also lead to congestions that can endanger the punctuality just as other external factors e.g. strikes or rain. Lastly, the vehicles used should also be able to cope with extreme weather conditions such as high temperatures.

### 5.3 Determining and scoring crucialness of success and failure factors

Based on the results described in section 5.2.2, it becomes clear that volume, customer service, efficient and sustainable delivery are very important. Volume has been the most mentioned failure factors (5 times), since it can help to make the last mile delivery more efficient and profitable. Socio-cultural factors are underlying the lack of social adoption of this service innovation (See 5.2.2.3). In order to keep the customers satisfied, many aspects can be taken into consideration such as punctuality, easy user interfaces that are personalized to the preferences of the customer and interactions with deliverers and customer services. Besides, an efficient delivery must take into consideration the travel to the customers' addresses and at the operations at the customers' place. According to the analysis in section 5.2.2, data, experience and communication is key. Travelling to the customers' addresses also impacts the environment. This is solved by adapting electrical vehicles that cause less noise. Thus, four key questions can be elicited from this analysis of success and failure factors of online grocery shopping in the Netherlands:

1. How do we build scale?
2. How do we keep the customers satisfied?
3. How can the (new) addresses be reached in an efficient and sustainable way?
4. How can the delivery at the customers' place be more efficient?

These key questions have been validated by an Accenture expert and a grocery retailer. Besides, an independent researcher with customer perspective and a bricks-and-clicks company have been asked to score these key questions on how important they are for the viability of online grocery shopping in the Netherlands on a five-point Likert Scale (1=Unimportant, 2=Slightly important, 3=Moderately important, 4=Important and 5=Very important). The results are presented in table 11. Just as for the scored objectives, it is important to notice that the scores of 2 stakeholders are not representative for all the customers and grocery retailers. The same argument for the results in table 12. The main reason to include only 2 stakeholders is because of time constraint. Therefore, the results should not be used as objective data, but rather as subject of discussion and to create a certain point of view. Besides, it can also be used for a certain validation of the results. However, no weights from the perspective of the other stakeholders has been gathered. This would also have enhanced the acceptability of the results.

**Table 11.** Scores on the crucialness of the key questions

Key questions	One CPIR	One GR	Average
<b>How do we build scale?</b>	5	4	4.5
<b>How do we keep the customers satisfied?</b>	5	4	4.5
<b>How can the (new) addresses be reached in an efficient and sustainable way?</b>	5	5	5
<b>How can the delivery at the customers' place be more efficient?</b>	5	3	4

The reason why the fourth key question is rated as “moderately important” by the bricks-and-clicks company is because it is more operational than the others. However, as an Accenture expert, an independents researcher and another bricks-and-clicks company has validated these questions as “very important”, this is considered as the result of subjectivity. Based on these key questions, five success and failure factors are found that are related to these key questions (See table 12). The selection of the success and failure factors are based on the crucialness of a certain category. An example is given:

**Example 1.**

The categories transport and delivery, IT and socio-cultural are most often mentioned by interviewees. Therefore, a transport and delivery factor like “Lack of data of (new) addresses” is more relevant to involve than market factor like “Customer is spoiled by other online delivery services (cheap, fast and good delivery) that leads to high costs”

Crucialness of a certain factor can also be determined based on other researches that have been discussed in chapter 4. An example is:

**Example 2.**

In section 4.1.1. it was mentioned that Dutch customers prefer to do groceries in the physical store and thus do not switch to online grocery shopping. Therefore, the failure factor “Customers prefer to do groceries in (mostly nearby) physical stores” has been involved.

Another way to determine the crucialness of a success or failure factor is the number of times a key word has been mentioned in section 5.2.2 and appendix F. These factors can be related to different aspects of the success or failure factors. Therefore, they are combined into one factor. An example is given:

**Example 3.**

Talkative customers and delivery until kitchen both impact time spent at a customer’s place and perhaps influence each other. Therefore, they are combined into “Talkative customers during delivery until kitchen” in order to involve both the failure factors.

It should be noted that this has been a subjective process, which can lead to different results if it has been done by another researcher. Therefore, the final list of the most important success and failure factors in the current Dutch market has been validated by a bricks-and-clicks company and an

Accenture expert. This means that the evaluation process can be continued with this list of success and failure factors. In order to determine how important the selected success and failure factors are for the viability of online grocery delivery in the Netherlands, an independent researcher with customer perspective and a bricks-and-clicks grocery retailer have been asked to score these on a five-point Likert Scale (1=Unimportant, 2=Slightly important, 3=Moderately important, 4=Important and 5=Very important). See table 12. The average scores of the most important factors are yellow.

**Table 12.** Success and failure factors per key question

Key question	Success and failure factor	One CPIR	One GR	Average
1. <b>How do we build scale?</b>	Customers prefer to do groceries in (mostly nearby) physical stores	5	4	4.5
	Customers don't like to do groceries in advance because they don't know what to eat	4	3	3.5
	Customers want to feel fresh products or know the expiration date before buying it	3	2	2.5
	Customers buy less online due to more cost consciences if they buy online and less impulse buys and thus might not reach the minimum order price	4	2	3
	Customer is used of a certain brand	3	2	2.5
2. <b>How do we keep the customers satisfied?</b>	Ideal time slots (day and time)	5	4	4.5
	Availability of preferred assortment or substitutes	4	4	4
	The lack of opportunity to add products last moment	2	2	2
	Lack of recommendation of groceries that the customer might want	2	3	2.5
	Lack of communication with customer and deliverer about arrival time	5	5	5
3. <b>How can the (new) addresses be reached in an efficient and sustainable way?</b>	Lack of data of (new) addresses	4	4	4
	No accurate routing time information	4	4	4
	Lack of experienced deliverers e.g. due to no reliable working hours	5	4	4.5
	High investments costs for electric vehicles and charging infrastructure and lock-in of current fleet of unsustainable vehicles that can carry more volume and have a larger range than electric vehicles	4	5	4.5
	Inefficient to consolidate deliveries of different grocery retailers due to extra handling costs	4	3	3.5
4. <b>How can the delivery at the customers' place be more efficient?</b>	Efficient payment system e.g. people still needs to get the payment cards, or the machine does not work	3	3	3
	People still need to return bottles or crates	4	3	3.5
	Talkative customers during delivery until kitchen	1	3	2
	Efficient way of finding groceries in the vehicle with no human mistakes	3	3	3
	Better trainings or evaluations for unsafe or impolite behaviors of drivers	5	3	4

The most important failure factor for the viability of online grocery shopping is the lack of volume because Dutch citizens prefer to do groceries in physical stores that are mostly well-located. The most

crucial success and failure factors for satisfying customers are related to a complete delivery that is on time and delivered at a moment that suits customers the best. Besides, for the last mile delivery it is very important to have the right data of addresses and accurate routing information. It is also important to train and evaluate drivers and to retain experienced drivers. This could lead to less incomplete deliveries and enhance the punctuality what is found important to satisfy customers. In order to be more sustainable in online grocery delivery, the usage of electric vehicles is very important, which is blocked by factors related to investment costs, lower range and volume of electric vehicles and lock-in of the current fleet.

Remarkably, five factors scored below 3, which means that they are slightly important. As can be seen in table 9, the Dutch grocery retailers already have a minimum expiration date policy and a money back guarantee if products are not fresh enough. This means that it is not very important for customers to know the expiration date or to feel fresh products before buying it. Furthermore, Picnic dominates at the areas it operates, whereas customers are not used of their brands (Business Insider Nederland, 2019). Besides, the lack of opportunity to add last moment products or the lack of recommendations will not endanger the viability of online grocery shopping. Also, talkative customers during delivery until kitchen is not crucial, which means that it is understandable that grocery retailers like Albert Heijn and Jumbo still offer this service (See table 10).

#### 5.4 Summary and discussion of the findings on success and failure factors

Based on the interviews with the stakeholders and experts, many success and failure factors have been identified and rated. This chapter summarizes and discuss these findings. Furthermore, these results are discussed in the perspective of the business models of Albert Heijn, Jumbo and Picnic that have also been analyzed and compared in this chapter.

First, a new framework has been developed to analyze 61 success factors and 103 failure factors retrieved from interviews with experts and stakeholders. The framework has been very useful to categorize the success and failure factors. However, as can be seen in figure 13, most of the failure factors were related to transport and delivery. This makes sense, since the interviews were focused on the last mile delivery of online groceries. Therefore, the framework could have been improved by adding more subcategories to the “transport and delivery” category.

Second, from these success and failure factors, four focus questions have been determined to enhance the viability of online grocery shopping in the Netherlands: 1. How do we build scale? 2. How do we keep the customers satisfied? 3. How can the (new) addresses be reached in an efficient and sustainable way? 4. How can the delivery at the customers’ place be more efficient? From these key questions, success and failure factors have been selected or combined that are related to these questions (See table 12). Based on these factors, solutions are designed in the next chapter. This means that many other factors have not been used for this thesis. However, these factors in appendix F can still be very useful for other purposes e.g. if solutions should be found for improving the human resource performance, the focus should not only be on hiring students, communication between HR and driver should be improved in order to offer people reliable working hours and people with more affinity with logistics should be hired.

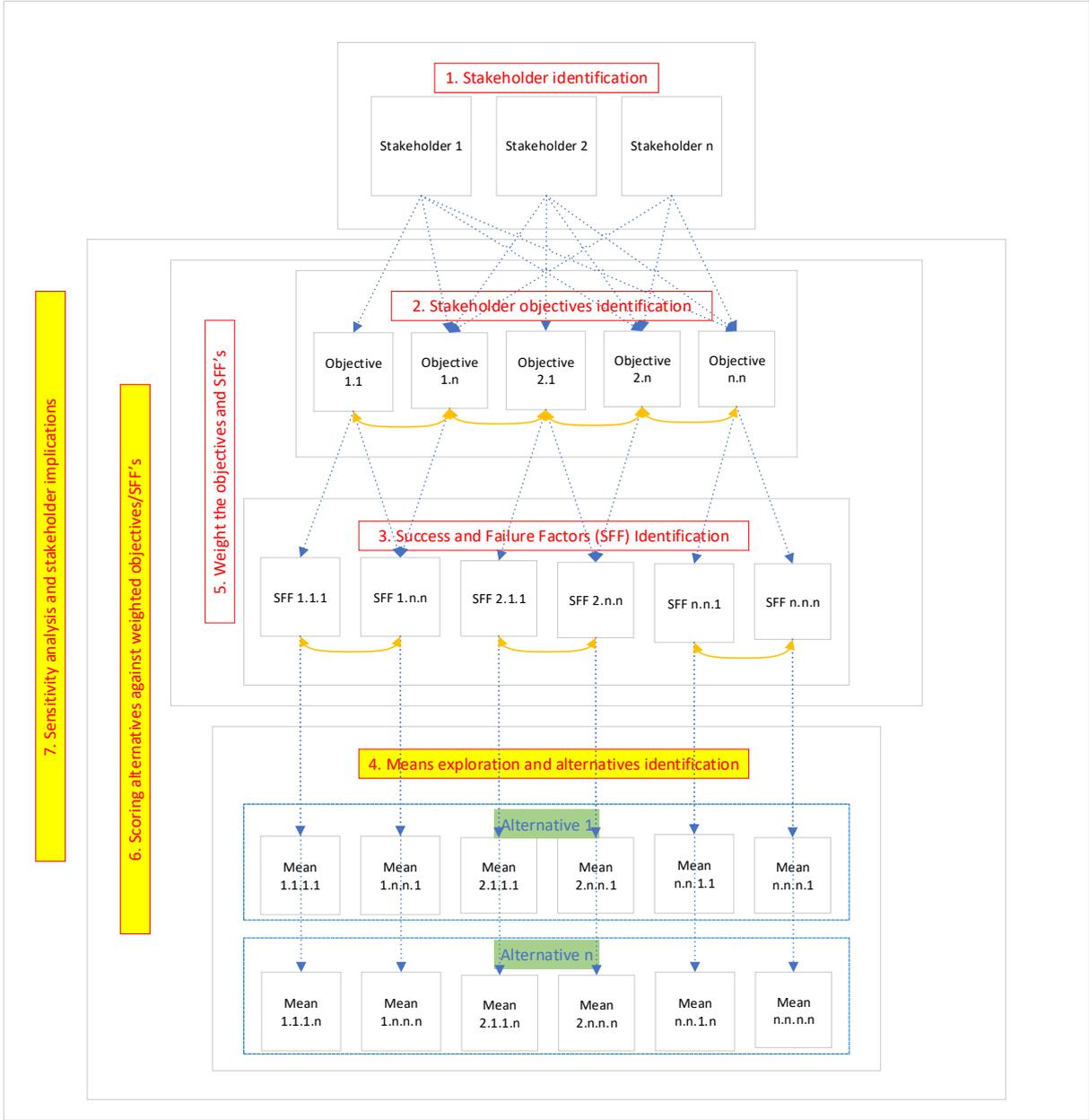
Third, the selected success and failure factors have been scored on how important they are for enhancing the viability of online grocery shopping in the Netherlands. The most important factor for building scale is that people still prefer to do groceries in the physical stores. In order to keep customers satisfied, the offered time slots should fit the schedules of the customers, all the products the customers want should be available and the communication between the deliverer and customer

about the arrival time should be more accurate. For reaching the addresses of the (new) customers more efficient and sustainable, more data of the addresses and routes should be gathered, more experienced deliverers should be hired or kept, and barriers of electric vehicles should be overcome e.g. investment costs, lower range and lock-in of current fleet. Not that the other factors are also important, since they are validated as important for the viability of online grocery shopping. However, these factors with high scores stand out according to an independent researcher and a bricks-and-clicks company. It is also important to mention that some scores are also important according to either the independent researcher or the bricks-and-clicks company but has been scored as less important by the other interviewee. Therefore, taken the average is not the best way to select the most important success and failure factors. It is just a compromise between two stakeholders that is not representative for all the stakeholders.

Fourth, relevance of these compromised crucial success and failure factors for the business models of Albert Heijn, Jumbo and Picnic are given. It seems that Albert Heijn and Jumbo must provide a more customer friendly delivery that is a lot less efficient e.g. more time slots, bigger assortment, delivery to the kitchen and take back beer crates. Besides, Albert Heijn and Jumbo both have much more customer data related to the products bought in a certain area e.g. on the bonus card of Albert Heijn. This enables them to make better predictions related to the availability of products that customers want. However, they do not have a “real life” tracker like Picnic, that might enhance the communication between the deliverer and customers about the arrival time. However, due to privacy issues, the track & trace service is not real time, but the location of the vehicle has been forecasted at every given moment of time of the route. Thus, this is also enhanced. Jumbo does ask the customer to write information about their addresses during the registration, which can make it more efficient. On the other hand, Picnic has a more efficient payment system since customers can only pay via IDEAL. Picnic also require a lower minimum order price and no delivery costs, which are reasons for people to still shop in the physical stores. Another reason to attract customers might be to deliver and take back beer crates, due to the weight. Furthermore, Picnic only delivers with electric vehicles. They cope with the problem of a low range, by letting the vehicles drive a very efficient route. Besides, Picnic did not have a fleet of unsustainable vehicles as opposed to Albert Heijn and Jumbo. However, all the parties do not have specific solutions for hiring and keeping experienced deliverers according to their websites and apps. Thus, given the different approaches for every success and failure factor, more research is needed to see what solutions should be used to overcome them. A first attempt is made in the next chapter.

# 6. Solutions for enhancing the viability of online grocery shopping in the Netherlands

This chapter focusses on the fourth, sixth and seventh step of the MAMSSFFMCA (the steps in yellow in figure 14).



**Figure 14.** Steps of the MAMSSFFMCA for eliciting and evaluating solutions

After conducting these steps, the fourth sub question is answered which is "How can the insights from the success and failure factors enhance the viability of online grocery shopping in the Netherlands from different stakeholder perspectives?" For eliciting alternatives from the most crucial success and failure factors (See table 12) to enhance the viability of online grocery shopping in the Netherlands, interviews with stakeholders and experts were conducted, a brainstorm session within Accenture was held and the perspective from the researcher was used. These processes are described and discussed in appendix L. The alternatives have been scored by bricks-and-clicks grocery retailers and an

independent researcher on the success and failure factors. This has led to how likely the alternatives can overcome a certain success or failure factor. Besides, they have also selected a set of most preferred alternatives based on the highest assigned likelihood of the alternatives. Section 6.1 focusses on choosing the most potential solutions from these preferred alternatives for every crucial success and failure factor for the evaluation process. In section 6.2, these alternatives are then scored on the stakeholders' objectives in table 6. For these results, also sensitivity analyses are performed in which the weights of the objectives are all equally important. In section 6.3, a summary and discussion of the most potential solutions are given.

## 6.1 Analysis of the solutions to enhance the viability of online grocery shopping

Solutions have been retrieved from interviews with stakeholders and experts, a brainstorm session within Accenture and the perspective from the researcher (see appendix L). Based on these solutions, an interview/survey was held with an independent researcher with customer perspective and a bricks-and-clicks company to select the best solutions to enhance the viability of online grocery shopping in the Netherlands. These solutions have also been scored by both interviewees. Therefore, this section focusses on presenting these results and to select the best solution for the evaluation process in section 6.2. The preferred solutions of the independent researcher and the bricks-and-clicks grocery retailer for every success and failure factor are evaluated within every key question in sections 6.1.1-6.1.4.

### 6.1.1 Selecting the solutions to build scale

An overview of the success and failure factors that are related to building scale and the chosen solutions by the independent researcher and grocery retailer are presented in table 13. In this table, also the scores can be seen that are assigned to a certain solution and the success and failure factors. As can be seen in table 13, three out of five success or failure factors have the same preferred and highest scored alternatives. These alternatives are scored by both the interviewees and thus, the average are taken by scoring them on the objectives. The original scores can be found in appendix K.

For the most important success and failure factor "customers prefer to do groceries in (mostly nearby) physical stores", both interviewees have preferred a different alternative. The independent researcher prefers the "Augmented Reality (AR) to shop in a virtual store" alternative. However, this alternative is not feasible on the short term due to high investment costs. Besides, to tackle this factor, it is important to build on a new habit of doing online grocery shopping instead of going to the store. Therefore, "offering flexible subscriptions that can easily be terminated" will be considered. For this, the scores of the grocery retailer are used for evaluation, since only these scores have been given. Also, for the second most important factor "Customers don't like to do groceries in advance because they don't know what to eat", two different alternatives have been preferred. However, both the alternatives of "Help to make a week planner of what to eat and what groceries are needed for a certain number of people" and "Offering same day delivery for people who don't know what to eat at locations where a lot of people work or come together" have been scored with a "4" by the grocery retailer. Besides, the grocery retailer also confirmed that "Offering same day delivery for people who don't know what to eat at locations where a lot of people work or come together" has a lot of potential. Therefore, this solution is considered. For this solution, only the scores on the objectives by the independent researcher are used, since only these scores are based on this alternative.

**Table 13.** Success and failure factors and the preferred solutions for building scale

Success and failure factor	One CPIR	One GR
<b>Customers prefer to do groceries in (mostly nearby) physical stores (IR:5 and GR:4)</b>	AR to shop in a virtual store (IR:4 and GR:2)	Offering flexible subscriptions that can easily be terminated (IR:3 and GR:3)
<b>Customers don't like to do groceries in advance because they don't know what to eat (IR:4 and GR:3)</b>	Offering same day delivery for people who don't know what to eat at locations where a lot of people work or come together (IR:5 and GR:4)	Help to make a week planner of what to eat and what groceries are needed for a certain number of people (IR:1 and GR:4)
<b>Customers want to feel fresh products or know the expiration date before buying it (IR:3 and GR:2)</b>	Be sure to always send fresh products and show expiration date and any other information clearly, however if products are of less quality then less information should be provided (IR:5 and GR:5)	Be sure to always send fresh products and show expiration date and any other information clearly, however if products are of less quality then less information should be provided (IR:5 and GR:5)
<b>Customers buy less online due to more cost consciences if they buy online and less impulse buys and thus might not reach the minimum order price (IR:4 and GR:2)</b>	Show people an automatic trade-off system of having a certain minimum order price or paying certain delivery costs (IR:4 and GR:4)	Show people an automatic trade-off system of having a certain minimum order price or paying certain delivery costs (IR:4 and GR:4)
<b>Customer is used of a certain brand (IR:3 and GR:2)</b>	Showing substitutes with information on the popularity of certain products and the benefits (IR:5 and GR:4)	Showing substitutes with information on the popularity of certain products and the benefits (IR:5 and GR:4)

### 6.1.2 Selecting the solutions to satisfy customers

This section focusses on answering the key question: "How do we keep the customers satisfied?" An overview of the success and failure factors that are related to this key question and the chosen solutions by the independent researcher and grocery retailer with the assigned scores are presented in table 14.

**Table 14.** Success and failure factors and the preferred solutions for satisfying customers

Success and failure factor	One CPIR	One GR
<b>Ideal time slots (day and time) (IR:5 and GR:4)</b>	To allow customers to pre-claim time slots (IR:5 and GR:4)	Amazon boxes for 'not at home' delivery including cool boxes (IR:1 and GR:5)
<b>Availability of preferred assortment or substitutes (IR:4 and GR:4)</b>	To bring substitutes to the doors if certain products are not available (IR:5 and GR:2)	Ask reason for having a product and then propose substitutes e.g. not having a "snack cucumber"; Customer giving the reason to have a healthy snack and then website or app propose "snack tomatoes" and "cucumber". (IR:1 and GR:5)
<b>The lack of opportunity to add products last moment (IR:2 and GR:2)</b>	One-click check out to add these products (IR: 5 and GR:4)	One-click check out to add these products (IR:5 and GR:4)
<b>Lack of recommendation of groceries that the customer might want (IR:2 and GR:3)</b>	Top 10 products directly in the bucket (IR:5 and GR:3)	At every tab of category of products, the discounted or most picked products by the customer are proposed (IR:4 and GR:4)
<b>Lack of communication with customer and deliverer about arrival time (IR:5 and GR:5)</b>	Message to customer pop-ups 5 minutes before arrival (IR:5 and GR:4)	More proactive communication with customer by calling or sending mails (IR:1 and GR:5)

As can be seen in table 14, only one solution, the "One-click check out to add these products" solution, has been scored the highest and is thus preferred by both the independent researcher or the bricks-and-clicks grocery retailer. Thus, the average score as been taken for evaluating this solution on the objectives. The other solutions are chosen based on the scores assigned by both the interviewees and the comments on the other alternatives. The bricks-and-clicks company scored both the solutions "To allow customers to pre-claim time slots" and "Amazon boxes for 'not at home' delivery including cool boxes" high (with a score of 4 and 5) and considered both solutions. The first one would be a good short-term solution, but the latter one had huge potential for the online grocery shopping market. Thus, the grocery retailer preferred this one. A skeptical remark can be made, why this solution is scored with a "1" by the independent researcher, is because there are already a lot of physical stores near people that also offer pick-up services (See table 14). However, more research can be made about the potential of this solution in the Netherlands. Thus, this alternative is chosen to make an evaluation. Besides, in appendix K the solution "To allow customers to pre-claim time slots" does not impact the objectives at all.

Also, the preferred solutions for the "availability of preferred assortment and substitutes" are different among the two interviewees. As opposed to the previous solutions, these solutions are totally complementary in opinion of to what extent the solutions are likely to overcome the success factor. They both agree on that all the proposed solutions will not necessary solve the problem, since they both focus on offering substitutes, while the customers just want a complete delivery of what they want. Given this remark, the solution "To bring substitutes to the doors if certain products are not available" will be considered, since this will not focus on having a solution taken in consideration that

products will be out of stock often, but just as the solution if a mistake is made. By having an algorithm that “Asks reason for having a product and then propose substitutes” it seems that the business model has been built around offering substitutes. Besides, Tesco, leader of the U.K. online grocery shopping market, also offers this service (Tesco, n.d.). This allows the evaluation of this service for the Dutch market.

Besides, for the challenge “Lack of recommendation of groceries that the customer might want” two solutions have been chosen that are both considered as a good solution. The independent researcher also agreed on that “At every tab of category of products, the discounted or most picked products by the customer are proposed” is a good solution. Therefore, this one is considered instead of “Top 10 products directly in the bucket”.

Lastly, the solution “Message to customer pop-ups 5 minutes before arrival” is considered, because “More proactive communication with customer by calling or sending mails” has the same aim but is vaguer. This vagueness can also involve more “useless” messages, which can be considered as annoying. Therefore, the first solution is chosen for evaluation.

### 6.2.3 Evaluation of the solutions to reach (new) addresses in an efficient and sustainable way

The following key question is focused on: “How can the (new) addresses be reached in an efficient and sustainable way?” In table 15, an overview of the success and failure factors that are related to this key question and the preferred solutions by the independent researcher and grocery retailer with the assigned scores are presented.

**Table 15.** Success and failure factors and the preferred solutions for satisfying customers

Success and failure factor	One CPIR	One GR
<b>Lack of data of (new) addresses (IR:4 and GR:4)</b>	Obtaining more data of the type of delivery locations e.g. high-rise or low-rise, during every delivery (IR:4 and GR:3)	Use customer loyalty programs to gather data relevant for delivery in order to better plan next deliveries and allow drivers to write special circumstances on customer’s profile (IR:4 and GR:4)
<b>No accurate routing time information (IR:4 and GR:4)</b>	Have planning algorithms based on real-time data and historic data (IR:5 and GR:5)	Have planning algorithms based on real-time data and historic data and using a suitable tool e.g. Google Maps (IR:4 and GR:5)
<b>Lack of experienced deliverers e.g. due to no reliable working hours (IR:5 and GR:4)</b>	A digital interface that provides a delivery checklist that guide delivery people (IR:5 and GR:4)	Give promotions, add more responsibility to deliverers with a higher ranking and thus being able to offer more reliable hours (IR:4 and GR:5)
<b>High investments costs for electric vehicles and charging infrastructure and lock-in of current fleet of unsustainable vehicles that can carry more volume and have a larger range than electric vehicles (IR:4 and GR:5)</b>	Sustainable in other ways than using electric vehicles e.g. better return policy of batteries, clothes or old plastic (IR:4 and GR:3)	Negotiation with government about subsidizes for the costs involved in replacing current fleet with electrical vehicles and making a long-term plan that can lead to pay back part of the subsidy if it has not been reached (IR:1 and GR:4)
<b>Inefficient to consolidate deliveries of different grocery retailers due to extra handling costs (IR:4 and GR:3)</b>	Having at least 2 days between the ordering and delivering will enhance the efficiency (IR:4 and GR:3)	Letting one company delivering all the groceries with the label of all the partners on the vehicles and clothes, assuring that benefits will be made per order for the grocery retailers and challenging the logistics service provider to achieve benefits from an efficient last mile delivery e.g. PostNL took over Sandd in order to make the postal delivery more efficient (IR:1 and GR:4)

As can be seen in table 15, only one solution, the “Have planning algorithms based on real-time data and historic data” solution, is preferred by both the independent researcher or the bricks-and-clicks

grocery retailer. However, it should be noted that the bricks-and-clicks grocery retailer also wanted to combine this alternative with a tool e.g. Google Maps. However, for the evaluation process, the average will be taken from the scores on the objectives for this solution, since both interviewees had the same solution in mind while scoring.

Furthermore, the alternatives “Use customer loyalty programs to gather data relevant for delivery in order to better plan next deliveries and allow drivers to write special circumstances on customer’s profile” and “Obtaining more data of the type of delivery locations e.g. high-rise or low-rise, during every delivery” almost have the same scores. Both solutions are combined, because the first solution allows to obtain data of the delivery locations as well.

Besides, the solutions “A digital interface that provides a delivery checklist that guide delivery people” and “Give promotions, add more responsibility to deliverers with a higher ranking and thus being able to offer more reliable hours” are both scored with a “4” and a “5” from either the interviewees. This means that both are likely to overcome the failure factor of a lack of experienced drivers. However, looking at the scores in appendix K, the first solution does not add more comfort for deliverers, which should be enhanced in order to keep more experienced drivers. The reason might be, because the deliverer must follow a checklist instead of doing what he or she thinks is best and most comfortable. Therefore, the second solution is involved in the evaluation process.

For being more sustainable, the interviewees preferred the solutions “Negotiate with government about subsidizes for the costs involved in replacing current fleet with electrical vehicles and making a long-term plan that can lead to pay back part of the subsidy if it has not been reached” or to be more “Sustainable in other ways than using electric vehicles e.g. better return policy of batteries, clothes or old plastic”. According to de Jong (2019), innovative local and regional collaboration solutions for urban logistics is considered by the government and private parties e.g. PostNL, to reduce the emissions and noise caused by the rise of vehicle movements. Thus, both alternatives can be combined as solution “Collaborate with government in order to get subsidizes for the costs involved in replacing current fleet with electrical vehicles and making a long-term plan to find other sustainable ways than only using electric vehicles e.g. better return policy of batteries, clothes or old plastic”. The government can find its role in this process by facilitating the development of a long-term plan with different grocery retailers and to subsidize to make it attractive for the companies. Given that this solution is the combination of both solutions, the average of the scores is taken.

Lastly, grocery retailers have elaborated that it is inefficient to consolidate the deliveries of different grocery retailers due to extra handling costs. Thus, two solutions have been preferred that can make the process more efficient: “Having at least 2 days between the ordering and delivering will enhance the efficiency” and “Letting one company delivering all the groceries with the label of all the partners on the vehicles and clothes, assuring that benefits will be made per order for the grocery retailers and challenging the logistics service provider to achieve benefits from an efficient last mile delivery e.g. PostNL took over Sandd in order to make the postal delivery more efficient”. The first solution allows to make a more efficient planning and to have more time to consolidate the groceries that can easily be combined. According to the independent researcher, the second solution is not feasible due to the difficulty to combine the different streams of packages. However, only groceries are considered, which means that the question was wrongly interpreted. Besides, given the scores of the first solution in appendix K, the solution “Having at least 2 days between the ordering and delivering will enhance the efficiency” have a negative impact on a lot of objectives. Therefore, the second solution is considered.

#### 6.1.4 Evaluation of the solutions to be more efficient at the customers' place

This section focusses on answering the following key question: "How can the delivery at the customers' place be more efficient?" An overview of the success and failure factors that are related to this key question and the preferred solutions by the independent researcher and grocery retailer with the assigned scores are presented in table 16.

**Table 16.** Success and failure factors and the preferred solutions to be more efficient at the customers' place

Success and failure factor	One CPIR	One GR
<b>Efficient payment system e.g. people still needs to get the payment cards, or the machine does not work (IR:3 and GR:3)</b>	Use direct debit for paying (IR:5 and GR:4)	As for all the web shops nowadays, only allow payment via Ideal with debit card, credit card or PayPal (IR:3 and GR:5)
<b>People still need to return bottles or crates (IR:4 and GR:3)</b>	Smart packages connected to apps that can send a reminder to bring bottles and crates to reimburse money when the deliverer almost reached the address. (IR:5 and GR:4)	Smart packages/CRM connected to apps that can send a message to customers on the moment they receive the estimated arrival time and one when deliverer is leaving the previous customer to bring bottles and crates to reimburse money when the deliverer almost reached the address (IR:4.5 and GR:4.5)
<b>Talkative customers during delivery until kitchen (IR:1 and GR:3)</b>	Options in app to let customers choose a preferred treatment by the deliverer e.g. talkative, assisted placement, customer helping with collecting the groceries or silent & drop (IR:4 and GR:3)	No delivery until kitchen (IR:3 and GR:4)
<b>Efficient way of finding groceries in the vehicle with no human mistakes (IR:3 and GR:3)</b>	Better algorithm that can assure completeness of the grocery orders e.g. better ordering of the crates/boxes/plastic bags in the vehicles (IR:4 and GR:4)	AR to help the deliverer to pick the groceries in the right order and will confirm if it is complete (IR:3 and GR:4)
<b>Better trainings or evaluations for unsafe or impolite behaviors of drivers (IR:5 and GR:3)</b>	Standardized training instead of personalized training from driver to driver (IR:5 and GR:4)	Using a rating system and opportunity to give tips to the deliverer, which will be evaluated by the team leaders and can lead to more standardized paid trainings in a classroom which is financed by the received tips. (IR:4 and GR:4)

As opposed to the other key questions, this key question has zero solutions that are preferred by both interviewees. Thus, a selection is made for every success or failure factor. However, preferred solutions

for making the process of picking up crates and bottles more efficient, are “Smart packages connected to apps that can send a reminder to bring bottles and crates to reimburse money when the deliverer almost reached the address” and “Smart packages/CRM connected to apps that can send a message to customers on the moment they receive the estimated arrival time and one when deliverer is leaving the previous customer to bring bottles and crates to reimburse money when the deliverer almost reached the address”. The latter is a combination of the first solution and “Send a message to customers on the moment they receive the estimated arrival time and one when deliverer is leaving the previous customer to have the bottles, crates or packages ready”. The bricks-and-clicks grocery retailer see a lot of potential in the first solution (see appendix K). This solution can become more feasible by connecting it to the Customer Relationship Management (CRM) system that keeps track on what the customers have ordered in the past. Therefore, the first solution is taken with both options of smart packages and the CRM system. For this, the average score is used to evaluate.

Nowadays all the e-commerce web shops allow to pay via Ideal with debit card, credit card or PayPal. However, for groceries the price is not always fixed, what makes this process not very efficient since extra money must be transferred and partly be refunded. An efficient payment system can therefore be using direct debit to pay. Innovative solutions for this are upcoming such as Account Information Services (AIS) that allows grocery retailers to see information on customers’ bank account and Payment Initiation Services (PIS) to allow the grocery retailer to take a direct debit customers’ account (Hasselaar, 2019). Thus, this solution is evaluated.

Grocery retailers like Albert Heijn and Jumbo offer delivery until the kitchen, but Picnic does not (See table 14). For both options, the deliverer can face talkative customers. This leads to inefficiencies at the customers’ place. Therefore, one preferred solution is “no delivery until kitchen”. However, some customers only choose to make use of the delivery service because it delivers until the kitchen. Grocery retailers that offer this service will not just stop doing it. Therefore, the solution “Options in app to let customers choose a preferred treatment by the deliverer e.g. talkative, assisted placement, customer helping with collecting the groceries or silent & drop” is proposed. This solution allows the grocery retailers to let customer pay for the services he or she wants, what otherwise would be lost due to inefficiencies.

Besides, the independent researcher said that the groceries in the vehicles are already found in an efficient way due to the used algorithms and tools used. This solution almost has the same score as the other solution “AR to help the deliverer to pick the groceries in the right order and will confirm if it is complete”. However, the latter alternative is not in used yet. Therefore, this solution is evaluated.

Lastly, both the alternatives “Standardized training instead of personalized training from driver to driver” and “Using a rating system and opportunity to give tips to the deliverer, which is evaluated by the team leaders and can lead to more standardized paid trainings in a classroom which is financed by the received tips” are scored really high with only scores of “4” and “5”. Therefore, the last solution has been chosen, since it also involves standardized training.

## 6.2 Evaluation of the solutions on acceptance and effectiveness

Besides the results of the previous section, this section evaluates the solutions on the stakeholders' objectives presented in table 6 to measure the effectiveness of the solutions. The chosen solutions in section 6.1 are evaluated within every key question in sections 6.2.1-6.2.4. For the evaluation, the weights of the objectives assigned by the independent researcher and bricks-and-clicks grocery retailer are used (see table 6). These weights are given based on the importance for the viability of online grocery shopping in the Netherlands. Besides, sensitivity analyses are applied by giving all the solutions the same weight. This allows the evaluation of the acceptance of every solution.

### 6.2.1 Evaluation of the solutions to build scale

The alternatives have been scored on the objectives of different stakeholders (See table 6). The scores were based on a five-point Likert Scale (1= - - =very negative impact, 2= - = negative impact, 3= +/- = no/barely any impact, 4= + = positive impact and 5= + + = very positive impact). The decision to let the interviewees fill in 1-5 instead of +/- signs or -2, -1, 0, 1, 2 is because this takes more effort for the interviewees, while it has already been a very exhausting survey. However, since the scores are cumulated, it is important to capture the right signs. Thus, the following transformations are made: 1=> -2, 2=> -1, 3=> 0, 4=> 1 and 5=> 2. It is important to notice that the average of 1 and -1 is 0 or -2 and 2. This result is mentioned explicitly, since it might raise discussion. However, it did not occur in any of the averages taken. The results are presented in the score card in table 17.

As can be seen in table 17, all the alternatives have a positive impact on having more customers, which validates that by using these solutions to overcome the assigned success and failure factors, more volume can be built. It also confirms that by using a solution that tackles the factor "Customers prefer to do groceries in (mostly nearby) physical stores" will have the largest impact to build scale. Besides having more customers, all these alternatives also have a positive impact on the profitability and the image. However, no solution impacts the politics and deliverer objectives. In order to determine a ranking of the best solutions for building scale and the acceptability among the stakeholders, the weighted sum score has been calculated of every solution in appendix M. The sum is taken from the scores of the solutions that are weighted by the weights assigned by the independent researcher and the bricks-and-clicks grocery retailer in table 10. These scores are assigned based on the importance of a certain objective for the viability of online grocery shopping in the Netherlands. This leads to weighted sum scores (WSC). In order to measure the acceptability of the solutions, all the objectives are weighted with "5" as well. This literally means that all the objectives are equally very important. This is also used as a sensitivity analysis in order to see whether the ranking of the best solutions are changed or not by using equal weights. The scores are presented in table 18.

**Table 17.** Score card on alternatives to build scale

Objectives	Alternatives				
	Offering flexible subscriptions that can easily be terminated	Offering same day delivery for people who don't know what to eat at locations where a lot of people work or come together	Be sure to always send fresh products and show expiration date and any other information clearly, however if products are of less quality then less information should be provided	Show people an automatic trade-off system of having a certain minimum order price or paying certain delivery costs	Showing substitutes with information on the popularity of certain products and the benefits
Low costs for grocery retailers	0	0	0	0.5	0.5
Good image	1	1	1	0.5	1.5
High punctuality	0	0	0.5	0	0
High profitability	1	1	1	0.5	1
More customers	2	1	1	1	0.5
High rate of complete orders	0	0	0	0	0.5
Low costs for customers	1	0	0	0	0
Ease for customers	1	2	0.5	0	0.5
Low CO <sub>2</sub> emissions	0	0	0	0	0
Low noise for citizens	0	0	0	0	0
More comfort for deliverers	0	0	0	0	0

As can be seen in table 17, the solutions are robust since no change in ranking appears given different weights. The best solution is to offer flexible subscriptions that can easily be terminated. However, it should be noted that it will only probably convince customers to not do grocery shopping in the physical stores. Thus, other solutions should also be considered. Offering same day delivery for people who don't know what to eat at locations where a lot of people work or come together is also a solution that can make a big positive impact. So, these two solutions are most likely to help building scale. Remarkably, showing people an automatic trade-off system of having a certain minimum order price or paying certain delivery costs is not a very impactful solution. This is done by several grocery retailers like DekaMarkt and Hoogvliet (See table 4) by for example offering 1 euro discount if the customer order more than a certain price.

**Table 18.** Weighted sum scores of the alternatives to build scale

	Offering flexible subscriptions that can easily be terminated	Offering same day delivery for people who don't know what to eat at locations where a lot of people work or come together	Be sure to always send fresh products and show expiration date and any other information clearly, however if products are of less quality then less information should be provided	Show people an automatic trade-off system of having a certain minimum order price or paying certain delivery costs	Showing substitutes with information on the popularity of a certain product and the benefits
WSC one CPIR	28	23	18	11.5	20
WSC one GR	28	23	19.5	12.5	22
WSC All "5"	30	25	20	12.5	22.5

**6.2.2 Evaluation of the solutions to satisfy customers**

This section focusses on the scores of the alternatives to satisfy customers on the objectives. These are presented in the score card in table 19. Also, these results are transformed from 1 to 5 to -2 to 2.

As can be seen in table 19, all the alternatives have a very positive impact on creating more ease for customers except for the alternative "To bring substitutes to the doors if certain products are not available". This is in line with the discussion that customers just want a complete order to be satisfied. By offering substitutes, only the negative impact is taken away. However, this solution does score high on many objectives, since it reduces the amount of times that a deliverer has to return to a certain customer to bring the right groceries and it satisfies the customers in a way that they will not complain or want the deliverer to find a another solution for it. Besides, it also means less money refund due to no delivery. Remarkably, the "Amazon boxes for 'not at home' delivery including cool boxes" has the highest score on every stakeholders' objective compared to the other solutions, which means that this solution dominates all the other solutions. For grocery retailers, it is a lot more efficient, due to less time spent at customers' places. For the customers, they don't have to wait for the groceries anymore and can do whatever they want in the meantime. For the government, less vehicle movements are needed, since certain groceries can be delivered to the same areas at the same time. For the deliverers, less contact with customers and less carrying until the kitchen will make it less heavy and thus more convenient. Lastly, the solution "One-click check out to add last moment products" is the only solution with negative impact on both the grocery retailer and customer objectives. This solution will allow customers to have a last moment message to quickly add products to their order. However, this service leads to less efficient planning and thus higher costs for both the grocery retailers and the customers. Besides, the chance of missing products will also enhance due to a more complex order system.

For these solutions, the weighted sum scores are also calculated. See table 20.

**Table 19.** Score card on alternatives to satisfy customers

Objectives	Alternatives				
	Amazon boxes for 'not at home' delivery including cool boxes	To bring substitutes to the doors if certain products are not available	One-click check out to add these products	At every tab of category of products, the discounted or most picked products by the customer are proposed	Message to customer pop-ups 5 minutes before arrival
Low costs for grocery retailers	2	2	-0.5	0	0
Good image	1	0	0	0	1
High punctuality	2	1	0	0	1
High profitability	1	1	0.5	1	0
More customers	2	0	0	1	0
High rate of complete orders	0	0	-0.5	0	0
Low costs for customers	1	0	-0.5	0	0
Ease for customers	2	0	1.5	2	2
Low CO <sub>2</sub> emissions	1	1	0	0	0
Low noise for citizens	1	0	0	0	0
More comfort for deliverers	2	1	0	0	1

**Table 20.** Weighted sum scores of the alternatives to satisfy customers

	Amazon boxes for 'not at home' delivery including cool boxes	To bring substitutes to the doors if certain products are not available	One-click check out to add these products	At every tab of category of products, the discounted or most picked products by the customer are proposed	Message to customer pop-ups 5 minutes before arrival
WSC one CPIR	65	25	2	19	24
WSC one GR	68	28	1.5	18	22
WSC All "5"	75	30	2.5	20	25

As can be seen in table 20, also these solutions are robust. As expected, the "Amazon boxes for 'not at home' delivery including cool boxes" is the best solution to satisfy customers. However, it is still remarkable, that this alternative is more than twice as good as the second-best solution "to bring substitutes to the doors if certain products are not available". Besides the fact that customers will only

be satisfied if they get complete orders, the solution “To bring substitutes to the doors if certain products are not available” has other benefits that might be interesting to consider. The best solution to satisfy customers next to these two solutions is the “message to customer pop-ups 5 minutes before arrival” solution. This will enhance the communication to the customers that will make the job easier for the deliverer since the customers will be more ready. This is also more convenient for the customer and thus improves the image of the grocery retailer.

### 6.2.3 Evaluation of the solutions to reach (new) addresses in an efficient and sustainable way

The scores of all the alternatives to reach the (new) addresses of customers in an efficient and sustainable way on the stakeholders’ objectives are presented in the score card in table 21. Also, these results are transformed from 1 to 5 to -2 to 2.

In table 21, all the solutions lead to a reduction of costs for grocery retailers, except for the solution to give promotions to experienced deliverers. The costs the salaries will not outweigh the efficiency gains. However, this will lead to more customers, since experienced workers usually know how to be more customer friendly than a new worker. The solution “Use customer loyalty programs to gather data (of the location) relevant for delivery in order to better plan next deliveries and allow drivers to write special circumstances on customer’s profile” has been dominated by this solution since it scores equal or higher on every objective. The solution to consolidate will lead to the largest cost reduction due to the highest efficiency. Besides, this solution will also reduce the CO<sub>2</sub> emissions and the noise for citizens. Thus, this solution will lead to a more efficient and sustainable way to reach the addresses. However, this will lead to less comfort for deliverers due to the delivery of different groceries from different grocery retailers and the grocery retailers will less be advertised during the delivery anymore. Also, the collaboration with government is a good solution to reach efficiency and sustainability objectives. This will lead to the most sustainable solutions. By using “planning algorithms based on real-time data and historic data and using a suitable tool”, not only efficiency and sustainability objectives will be reached, but also a better punctuality. With this solution, better estimations can be made. For these solutions, the weighted sum scores are also calculated. See table 22.

**Table 21.** Score card on alternatives to reach (new) addresses in an efficient and sustainable way

Objectives	Alternatives				
	Use customer loyalty programs to gather data (of the location) relevant for delivery in order to better plan next deliveries and allow drivers to write special circumstances on customer’s profile	Have planning algorithms based on real-time data and historic data and using a suitable tool	Give promotions, add more responsibility to deliverers with a higher ranking and thus being able to offer more reliable hours	Collaborate with government in order to get subsidizes for the costs involved in replacing current fleet with electrical vehicles and making a long-term plan to find other sustainable ways than only using electric vehicles	Letting one company delivering all the groceries with the label of all the partners on the vehicles and clothes, assuring that benefits will be made per order for the grocery retailers and challenging the logistics service provider to achieve benefits from an efficient last mile delivery
Low costs for grocery retailers	0.5	1.5	-1	1.5	2
Good image	0	1	1	1	-1
High punctuality	1	2	1	0	0
High profitability	0	0	0	0.5	0
More customers	0	0	1	0.5	0
High rate of complete orders	0	0	0	0	0
Low costs for customers	0	0	0	0	0
Ease for customers	0	0.5	0	0	0
Low CO <sub>2</sub> emissions	0.5	0.5	0	2	1
Low noise for citizens	0	0	0	1.5	1
More comfort for deliverers	1	1	1	0.5	-1

The results in table 21 show that the solution of collaboration for sustainability is not robust. Grocery retailers will only collaborate with governments if governmental objectives, as low CO<sub>2</sub> emissions and low noise for citizens, are priorities for the grocery retailers. According to the independent researcher, most of the grocery retailers will soon only deliver in electric vehicles, which means that they do not priorities the governmental objectives for enhancing the viability of online grocery shopping in the

Netherlands. However, the grocery retailers do think it is important. Thus, the solution can be considered. Besides this alternative, the highest scoring alternative is to “Have planning algorithms based on real-time data and historic data and using a suitable tool”. The solution “Letting one company delivering all the groceries with the label of all the partners on the vehicles and clothes, assuring that benefits will be made per order for the grocery retailers and challenging the logistics service provider to achieve benefits from an efficient last mile delivery” is also more attractive if governmental objectives are more prioritized. The other solutions do not have a huge impact and are very robust with a maximum difference of respective two and one point(s).

**Table 22.** Weighted sum scores of the alternatives to reach (new) addresses in an efficient and sustainable way

	Use customer loyalty programs to gather data (of the location) relevant for delivery in order to better plan next deliveries and allow drivers to write special circumstances on customer’s profile	Have planning algorithms based on real-time data and historic data and using a suitable tool	Give promotions, add more responsibility to deliverers with a higher ranking and thus being able to offer more reliable hours	Collaborate with government in order to get subsidizes for the costs involved in replacing current fleet with electrical vehicles and making a long-term plan to find other sustainable ways than only using electric vehicles	Letting one company delivering all the groceries with the label of all the partners on the vehicles and clothes, assuring that benefits will be made per order for the grocery retailers and challenging the logistics service provider to achieve benefits from an efficient last mile delivery
WSC one CPIR	13	29.5	14	22	3
WSC one GR	13.5	30.5	14	33.5	9
WSC All “5”	15	32.5	15	37.5	10

**6.2.4 Evaluation of the solutions to be more efficient at the customers’ place**

The scores of all the solutions for being more efficient at the customers’ place on the stakeholders’ objectives are presented in the score card in table 23. Also, these results are transformed from 1 to 5 to -2 to 2.

**Table 23.** Score card on alternatives to be more efficient at the customers' place

Objectives	Alternatives				
	Use direct debit for paying	Smart packages/CRM connected to apps that can send a message to customers on the moment they receive the estimated arrival time and one when deliverer is leaving the previous customer to bring bottles and crates to reimburse money when the deliverer almost reached the address	Options in app to let customers choose a preferred treatment by the deliverer e.g. talkative, assisted placement, customer helping with collecting the groceries or silent & drop	AR to help the deliverer to pick the groceries in the right order and will confirm if it is complete	Using a rating system and opportunity to give tips to the deliverer, which will be evaluated by the team leaders and can lead to more standardized paid trainings in a classroom which is financed by the received tips
Low costs for grocery retailers	0	0.5	0	1	-1
Good image	0	0	1	0	0
High punctuality	0	1	0	1	1
High profitability	0	1	0	0	0
More customers	0	0	0	0	0
High rate of complete orders	0	0	0	1	1
Low costs for customers	0	0	0	0	0
Ease for customers	-1	1	1	0	0
Low CO <sub>2</sub> emissions	0	0	0	0	0
Low noise for citizens	0	0	0	0	0
More comfort for deliverers	0	2	0	1	1

In table 23, the solution “use direct debit for paying” does not have any positive effect on the objectives. This result is probably not compared with paying at the door, but only to implement this technology. Compared to paying at the door, this innovation could have enhanced many objectives e.g. punctuality, more comfort for drivers, ease for customers and perhaps also lower costs since it will save a lot of time. However, further research is needed to these benefits. It also makes sense that it

provides less ease for customers if it is just implemented without comparison since the customers will allow the grocery retailers to get information from their bank accounts. Besides, “Using a rating system and opportunity to give tips to the deliverer, which will be evaluated by the team leaders and can lead to more standardized paid trainings in a classroom which is financed by the received tips” leads to costs for the grocery retailer to maintain the system and to organize the trainings. It makes sense that it cannot be totally financed by the tips. However, it will lead to higher punctuality and more complete orders, which are very important objectives for the grocery retailers. It also provides more comfort for deliverers. However, this solution is dominated by the solution “AR to help the deliverer to pick the groceries in the right order and will confirm if it is complete”, since it scores that same on all the objectives but scores more positive on the costs for the grocery retailer. The solution “Options in app to let customers choose a preferred treatment by the deliverer e.g. talkative, assisted placement, customer helping with collecting the groceries or silent & drop” provides ease to the customer and is the only solution for this key question that will enhance the image of the company. The most potential idea is the “Smart packages/CRM connected to apps that can send a message to customers on the moment they receive the estimated arrival time and one when deliverer is leaving the previous customer to bring bottles and crates to reimburse money when the deliverer almost reached the address” solution. This solution will be the only solution that will lead to both lower cost and a higher profitability of the grocery retailer also due to a better punctuality. Besides, the efficiency at the customers’ place also enhances the comfort for deliverers who do not have to wait for the crates or bottles anymore. This solution also enhances the ease for the customer, since the customer will be reminded to return certain bottles or crates.

**Table 24.** Weighted sum scores of the alternatives to be more efficient at the customers’ place

	Use direct debit for paying	Smart packages/CRM connected to apps that can send a message to customers on the moment they receive the estimated arrival time and one when deliverer is leaving the previous customer to bring bottles and crates to reimburse money when the deliverer almost reached the address	Options in app to let customers choose a preferred treatment by the deliverer e.g. talkative, assisted placement, customer helping with collecting the groceries or silent & drop	AR to help the deliverer to pick the groceries in the right order and will confirm if it is complete	Using a rating system and opportunity to give tips to the deliverer, which will be evaluated by the team leaders and can lead to more standardized paid trainings in a classroom which is financed by the received tips
WSC one CPIR	-5	26.5	9	20	10
WSC one GR	-4	24.5	9	19	9
WSC All “5”	-5	27.5	10	20	10

For these solutions, the weighted sum scores are also calculated. See table 24. The results are in line with the expectations, which is that “use direct debit for paying” only has a negative impact and “Smart packages/CRM connected to apps that can send a message to customers on the moment they receive the estimated arrival time and one when deliverer is leaving the previous customer to bring bottles and crates to reimburse money when the deliverer almost reached the address” is the best solution. The solution “AR to help the deliverer to pick the groceries in the right order and will confirm if it is complete” is the second-best option. Using a certain uber-concept with choosing the preferred treatments and rating of the deliverer, will only lead to small positive benefits. The results are very robust.

### 6.3 Summary and discussion of most potential solutions to enhance the viability of online grocery shopping in the Netherlands

In this chapter, the most potential solutions that were elicited from interviews, brainstorm sessions and from the perspective of the researcher, have been chosen and evaluated. These were based on the most crucial success and failure factors in table 12. An overview of the most potential solution per key question to enhance the viability of online grocery shopping in the Netherlands is given in table 25. In this table, shades are used to provide information on how well a certain solution has been scored on the stakeholders’ objectives. Green means that a solution has an overall positive score on the objectives and red means an overall negative score. Besides, the higher the solution scores on the objectives (given a weight of 5 on all objectives), the darker the color is.

The solutions for building scale all have a small positive effect on the stakeholders’ objectives. From these, offering subscription that can easily be terminated have the most potential, since it helps the customers in building a new habit. The most potential solution for satisfying customers is the Amazon boxes for ‘not at home’ delivery including cool boxes. This solution has the highest overall score on all the objectives compared to all the other proposed solutions. Thus, this solution has the highest potential for enhancing the viability of online grocery shopping in the Netherlands. To become more efficient and sustainable in the delivery of the online groceries to the (new) addresses of the customers, two solutions might be very effective. The first solution is to have a planning algorithm based on real-time data and historic data and to use a suitable tool. The second solution is to collaborate with government to replace current fleets of unsustainable vehicles with electric vehicles and to find other ways to be more sustainable. However, in order to become more efficient at the customers’ place, no proposed solution has been very effective according to the interviews with the independent researcher and a bricks-and-clicks company. Using direct debit to pay will even lead to a negative effect on the viability of online grocery shopping.

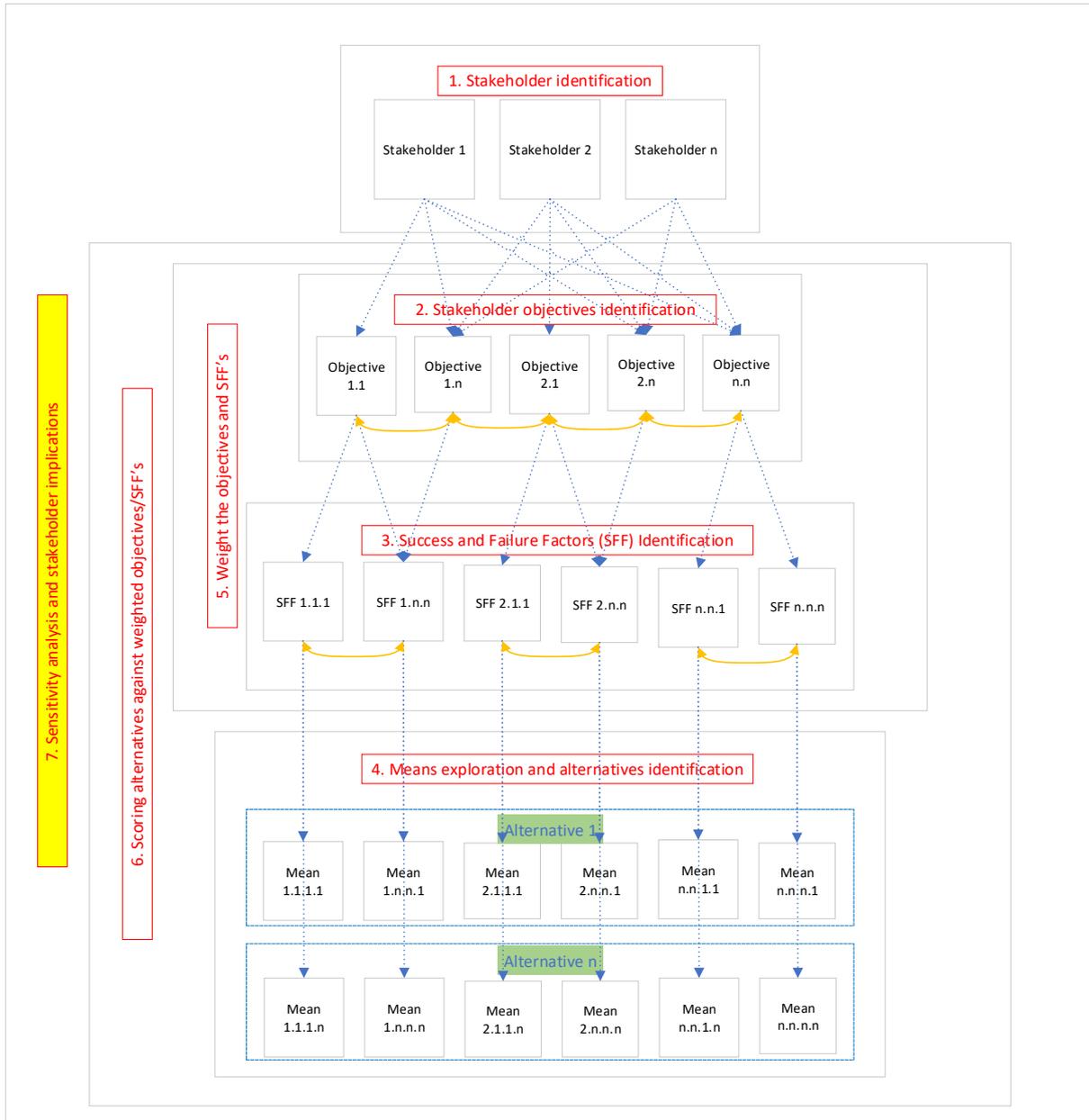
However, it is important to mention that all the alternatives in table 25 are very different. Some solutions involve very big investments and changes such as the Amazon boxes for ‘not at home’ including cool boxes, while other solutions like a message to pop-ups 5 minutes before arrival is very easy to implement. Thus, this means that it is unfair to compare these solutions with each other only based on the impact they have on the objectives. Therefore, a solution with a lower impact might be preferred due to less effort. Besides, it should be noted that the results of table 25 were only based on the scores assigned by either one of the two interviewees or both. Besides the low representativeness, these are subjective scores and not objective scores. Therefore, the scores should only be used as a starting point for discussion, but not as a fact. Therefore, the next chapter should focus on stakeholder implications for all the solutions and not only the best scoring alternatives.

**Table 25.** Overview of the most potential evaluated solutions

To build scale	To satisfy customers	To be more efficient and sustainable to the addresses	To be more efficient at the customers' places
Offering flexible subscriptions that can easily be terminated	Amazon boxes for 'not at home' delivery including cool boxes	Use customer loyalty programs to gather data (of the location) relevant for delivery in order to better plan next deliveries and allow drivers to write special circumstances on customer's profile	Use direct debit for paying
Offering same day delivery for people who don't know what to eat at locations where a lot of people work or come together	To bring substitutes to the doors if certain products are not available	Have planning algorithms based on real-time data and historic data and using a suitable tool	Smart packages/CRM connected to apps that can send a message to customers on the moment they receive the estimated arrival time and one when deliverer is leaving the previous customer to bring bottles and crates to reimburse money when the deliverer almost reached the address
Be sure to always send fresh products and show expiration date and any other information clearly, however if products are of less quality then less information should be provided	One-click check out to add these products	Give promotions, add more responsibility to deliverers with a higher ranking and thus being able to offer more reliable hours	Options in app to let customers choose a preferred treatment by the deliverer e.g. talkative, assisted placement, customer helping with collecting the groceries or silent & drop
Show people an automatic trade-off system of having a certain minimum order price or paying certain delivery costs	At every tab of category of products, the discounted or most picked products by the customer are proposed	Collaborate with government in order to get subsidizes for the costs involved in replacing current fleet with electrical vehicles and making a long-term plan to find other sustainable ways than only using electric vehicles	AR to help the deliverer to pick the groceries in the right order and will confirm if it is complete
Showing substitutes with information on the popularity of certain products and the benefits	Message to customer pop-ups 5 minutes before arrival	Letting one company delivering all the groceries with the label of all the partners on the vehicles and clothes, assuring that benefits will be made per order for the grocery retailers and challenging the logistics service provider to achieve benefits from an efficient last mile delivery	Using a rating system and opportunity to give tips to the deliverer, which will be evaluated by the team leaders and can lead to more standardized paid trainings in a classroom which is financed by the received tips

## 7. Implications for stakeholders

This chapter focusses on the implications for stakeholders as the result of the scores of the identified success and failure factors and the scores of the preferred alternatives. This is the seventh step of the MAMSSFFMCA (this step is in yellow in figure 15). The implications are given per key question in sections 7.1-7.4.



**Figure 15.** Step of the MAMSSFFMCA for giving stakeholder implications based on all the steps

### 7.1 Implications for stakeholder in building scale for online grocery shopping in the Netherlands

As can be seen in table 25, for building scale it is very important to build a new habit for customers that prefer to do groceries in the physical stores. For this, the alternative to offer flexible subscriptions that can easily be terminated has been the most potential solution for both bricks-and-clicks grocery retailers as pure players. As can be seen in table 7, only Albert Heijn provides a subscription. This

solution will directly impact the customers that make use of it. Besides, by using subscription that focusses on habit building, it is very important to have data analysts and the right software to capture the right information of the customers. This solution means that on the long term, a certain neighborhood will be provided with groceries on a certain moment of the week which repeats. This means that a certain deliverer might only drive the same route every week, which means that it will become a routine and optimal use of the experience of the deliverer will be made. This will enhance the image, since the customers will see a familiar face more often. However, this might be boring for the deliverers. Given the fact that a certain routine has been build, there could also be more focused on return policies e.g. dropping certain products in the center of the neighborhood that can be taken away every week. These solutions can be made in collaboration with governments that can facilitate these kinds of dropping points and to make agreements with web stores and delivery companies like PostNL.

However, this solution of building habit by offering subscriptions contradicts the second most important failure factor, which is that people do not like to order in advance, because they usually do not know what to eat. For this, same day delivery for people who don't know what to eat at locations where a lot of people work or come together, can be offered. This solution is in line with the pilots of Albert Heijn and Jumbo that collaborates with food delivery companies such as SuperBuddy and FoodDrop (van der Linden, 2018, & Neerman, 2019). Besides, Albert Heijn also sells complete warm meals in Amsterdam that will be delivered by Thuisbezorgd.nl and Deliveroo since the beginning of 2019 (Albert Heijn, 2019). This has implications for take-away restaurants, since Albert Heijn will take away a certain market share. Besides, if delivery companies take part of delivering groceries, this offers an opportunity for them to grow since the grocery market is different from the market of home delivery of meals. These initiatives will give the bricks-and-clicks companies a benefit compared to the pure players, since the bricks-and-clicks companies have physical locations in the city centers. However, this might also have implications for deliverers of the delivery companies. Most of the same day deliveries are provided by e-bike, which means that it might be very heavy for the deliverers. This might also lead to the shift of adding electric vehicles to the business models of these companies. This could have implications for the manufacture. For the government, this means more inefficient deliveries that will enhance the vehicle movements that might endanger the traffic safety. Thus, certain laws or policies can be made that will block these initiatives if it has grown too much.

Other reasons why it is difficult to build scale is that people want to feel fresh products, are used of a certain brand that must also be offered online and that they are more cost conscience online and thus, do fewer impulse buys. For these challenges, solutions are related to provide more information on the freshness of the products, on products of other brands and the cost savings of ordering more volume. These solutions will mainly focus on how the bricks-and-clicks and pure player grocery retailers present their brand, products and services. This will thus have implications for the marketing teams and website/apps-developers.

## 7.2 Implications for stakeholder in satisfying customers of online grocery shopping in the Netherlands

To keep the customers satisfied, it is very important to be able to deliver the products that the customer wants, whenever it suits the customer and being punctual in the delivery. For delivering the products the customer want, different stakeholders are involved. Agreements with the suppliers must be made that they can deliver the right products at the right time. Besides, it is also important to have good data analysts that can make precise predictions. Also, as can be seen in table 9, Picnic only delivers around 10.000 products. This means that not all the products that the customer usually wants,

can be ordered. It is also possible that certain products are out of stock. This will have implications for the customers that they need to order substitutes. For this the solution “To bring substitutes to the doors if certain products are not available” is proposed. This solution will reduce the costs of customer services for customers that complain and the costs of delivering new products. This will also be a way for the deliverer to still satisfy the customers, which will also enhance the punctuality. Besides, this will also lead to less refunds, which will enhance the profitability. However, for these benefits, a more complex supply chain is required. If certain products cannot be delivered, the pickers should pick substitutes. Besides, the customers should also be asked whether they want a certain product or not. This might be at the door, but it could also be via the app. For this, app-developers should also be involved. Besides the benefits for the deliverer, this also have negative implications such as more handlings. For the governmental objectives, this solution will reduce the CO<sub>2</sub> emissions, since products do not have to be delivered again.

For delivering the groceries whenever it is suitable for the customers, it is important to offer ideal time slots. However, this might not always be feasible for the grocery retailers. Therefore, the solution “Amazon boxes for ‘not at home’ delivery including cool boxes” has been evaluated. This solution has several implications for stakeholders. The deliverers will experience a lot more comfort, since they do not have to go into the houses of customers. Besides, the customers will have the groceries whenever they want. They also don’t have to wait for the deliverer anymore. Furthermore, the grocery retailers will face a lot more efficiencies that it will lead to lower costs and higher profitability. These boxes are also good for the images of grocery retailers and will thus lead to more customers. This solution is especially attractive for pure players that do not have pick-up points or bricks-and-clicks companies at areas where they do not have a close physical store. This solution will also reduce CO<sub>2</sub> emissions due to the more efficient deliveries, which is preferred by the government. The government should also play a role in this solution by facilitating suitable street and building designs for these boxes.

Another important factor for satisfying the customers is good communication between deliverer and customer about the arrival time. For this, a message that pop-ups 5 minutes before arrival will help providing ease for the customers. This gives a better indication on when the deliverer will arrive, what means that customers can do everything that he or she wants in the meantime. The deliverers will face a quicker delivery process, which will provide them comfort. Besides, the efficiency will lead to more punctual deliveries and thus a better image of the company. This will be beneficial for the bricks-and-clicks grocery retailers or the pure players. For this, apps-developers should implement a notifications system that the deliverer can easily send to the customers.

Two factors that are less relevant for the viability of online grocery shopping are the lack of opportunity to add last moment products and the lack of recommendations of groceries that the customers might want. The “One-click check out to add these last moment products” solution will come with a cost for both the grocery retailers as the customers. Thus, both the parties should agree on whether it will add enough value to pay for. For the grocery retailer it should be determined whether the profits will outweigh the costs and for the customer whether the provided ease is worth to pay for. For this solution, technological companies such as Amazon might be involved (Amazon, n.d.). For recommending groceries, the solution “At every tab of category of products, the discounted or most picked products by the customer are proposed” was evaluated. This will be a lot more convenient for customers, since time for ordering will be reduced. Besides, this might lead to more customers that like to use this service and thus more profits for the bricks-and-clicks companies and the pure players. For this, website/apps-developers should be involved that can implement the right algorithms.

### 7.3 Implications for stakeholder in enhancing the efficiency and sustainability of the grocery delivery to addresses in the Netherlands

Reaching the (new) addresses in an efficient and sustainable way is the most important challenge to achieve for a viable online grocery shopping system in the Netherlands. For this, it is important to have accurate data of the delivery routes and locations and experienced deliverers that know the most efficient ways of doing the job. For gathering data of addresses, the solution to “Use customer loyalty programs to gather data (of the location) relevant for delivery in order to better plan next deliveries and allow drivers to write special circumstances on customer’s profile”, can be used. For this solution, technology companies should be involved that can develop such an online loyalty program and to analyze the data. This has implications for customers, that need to provide more specific information about themselves and their addresses. However, this will lead to a more punctual delivery, which is beneficial for the customers. Besides, it also takes away the hassle for deliverers to find the right address and to be on time. This efficiency will lead to lower cost for the grocery retailers and lower CO<sub>2</sub> emissions that will help the government achieve their objectives. However, a solution to achieve even more efficiencies is to “Have planning algorithms based on real-time data and historic data and using a suitable tool”. For this, technology companies must develop the tools and software that captures real-time data. A way to capture these real-life data might be to let deliverers answer questions on certain traffic situations or address specifications via an app. This will help the deliverers to find a more efficient way to the customers and thus a better punctuality. This will be favored by both the deliverers and the customers. Another way to enhance the punctuality, is to have experienced drivers that know a lot of the routes and procedures. A way to keep them is to “Give promotions, add more responsibility to deliverers with a higher ranking and thus being able to offer more reliable hours”. Experienced drivers will also enhance the image of the company usually. However, this will lead to more costs for the grocery retailers, which might not be profitable to do. For the deliverers, this solution will give them a steady job that will convince them to stay.

Solutions for reaching an efficient and thus a sustainable last mile delivery is to consolidate deliveries of different grocery retailers. The solution “Letting one company delivering all the groceries with the label of all the partners on the vehicles and clothes, assuring that benefits will be made per order for the grocery retailers and challenging the logistics service provider to achieve benefits from an efficient last mile delivery e.g. PostNL took over Sandd in order to make the postal delivery more efficient” will have implications for different stakeholders. The deliverers will face groceries from different grocery retailers, which will enhance the handlings and is thus less convenient. The deliverer also needs to represent different companies, which will have a negative impact for the image of a certain company. However, it will reduce the costs for the grocery retailers, and it will also reduce CO<sub>2</sub> emissions and noise for customers, which means a positive effect on the government objectives. Logistics service providers like PostNL can then serve as an important player in this process. Besides, grocery retailers will also make profits with this solution.

Another way to reach the sustainability objectives is to “Collaborate with government in order to get subsidizes for the costs involved in replacing current fleet with electrical vehicles and making a long-term plan to find other sustainable ways than only using electric vehicles”. This solution is scored very high on all the stakeholders’ objectives. However, it is important that the grocery retailers prioritize the sustainable objectives in order to decide to choose for this solution. This solution will have implications for many stakeholders. First, the government will play an important role in facilitating the long-term plans with the involved parties. The government will also support the project with subsidies. This will lead to less noise for the citizens and lower CO<sub>2</sub> emissions. Secondly, manufactures of electric

vehicles will be involved in order to have suitable vehicles for delivering grocery orders. Thirdly, grocery retailers will have lower costs for replacing their current fleet of vehicles. Fourthly, other companies that are involved in return policies can also be involved such as web shops.

#### 7.4 Implications for stakeholder in enhancing the efficiency of grocery delivery at the customers' place

The efficiencies at the customers place can be enhanced in order to enhance the viability of online grocery shopping in the Netherlands. For this, certain aspects are possibly important to consider such as the payment system, the fact that some customers still need to get bottles or crates, talkative customers while delivering until the kitchen and finding the groceries in the vehicle. An aspect that is definitely important are the trainings and evaluation of the behaviors of the deliverers. For this, the solution "Using a rating system and opportunity to give tips to the deliverer, which will be evaluated by the team leaders and can lead to more standardized paid trainings in a classroom which is financed by the received tips" have been proposed. This will lead to higher costs for the grocery retailer, but it will enhance the image of the company. Besides, the deliverers will also become more comfortable because of these trainings and the punctuality will also be enhanced. However, the solution is not very effective in reaching the stakeholders' objectives. For this solution, technology companies are important to develop a rating system. Besides, the human resource team will also have to design a standardized training for the deliverers. The reason why the trainings must be paid, is to make it more attractive for people to become a deliverer.

On the other side, the most effective solution is "Smart packages/CRM connected to apps that can send a message to customers on the moment they receive the estimated arrival time and one when deliverer is leaving the previous customer to bring bottles and crates to reimburse money when the deliverer almost reached the address", since it provides the most comfort for the deliverer, ease for customers and profits, due to better punctuality, for the grocery retailers. Technology companies must first invent smart packages that can be used for this purpose. However, an alternative is to use a CRM to keep track on what customers have ordered. Customers will be reminded to reimburse the money of the bottles and crates, which is very beneficial for them. Another solution that is beneficial for them is the delivery until kitchen that both Albert Heijn and Jumbo offer (see table 10). However, this is heavy for the deliverers and leads to inefficiencies in the delivery process. However, some customers want this service and the grocery retailers that offer this service have planned the time of delivery until kitchen in the schedules. Nevertheless, this is more efficient. Therefore, the solution "Options in app to let customers choose a preferred treatment by the deliverer e.g. talkative, assisted placement, customer helping with collecting the groceries or silent & drop" is evaluated. This allows the customer to choose for the service if they want to. This also means that the inefficiency costs will be paid by the customers. Thus, companies e.g. Picnic, that do not offer certain services can use this to enhance the ease for their customers that make use of it, which will also enhance their image.

A way to enhance the comfort for deliverers is to use "AR to help the deliverer to pick the groceries in the right order and will confirm if it is complete". This will reduce the mistakes and enhances the speed of finding the right groceries. This leads to lower costs for the grocery retailers. It will also lead to better punctualities. However, a first investment must be made. This system should be developed by technology companies. Another system that must be developed is the use of direct debit for paying using the newest technologies. This will be more efficient than paying at the door, but more research to the benefits is needed. Also, banks will be involved in this innovation. Besides, the government must ensure the privacy rights of its citizens.

## 8. Conclusions, discussions and recommendations

The aim of this thesis was to answer the following research question: *“What are the success and failure factors in last mile delivery of online groceries that are relevant for analyzing and evaluating the viability of online grocery shopping for different stakeholders in the Netherlands?”* From this, four sub questions were derived:

1. What suitable frameworks can be found in literature for analyzing and evaluating the success and failure factors of the online grocery delivery models?
2. What are the roles and objectives of various last mile delivery stakeholders in the viability of online grocery shopping in the Netherlands?
3. What are the most important success and failure factors of the current Dutch last mile delivery concepts of online groceries from the perspectives of different stakeholders?
4. How can the insights from the success and failure factors enhance the viability of online grocery shopping in the Netherlands from different stakeholder perspectives?

Firstly, the conclusions of each of these sub questions are given in section 8.1. Secondly, the discussion of the findings given the limitations of this thesis are elaborated in section 8.2. Lastly, given the findings and limitations, recommendations are given for future research in section 8.3.

### 8.1 Conclusions of the Research

This thesis has contributed to the scientific literature by 1. designing and applying a new method called the Multi-actor Multi-Success-and-Failure Factors Multi-criteria Analysis (MAMSFFMCA) that bridges the gap of the analysis and evaluation of success and failure factors and the proposal and evaluation of (innovative) solutions 2. identifying the success and failure factors of the last mile delivery of online groceries in the Netherlands from the perspective of different stakeholders and analyzing them by using an own designed framework due to the lack of applicable frameworks in the literature 3. proposing (innovative) solutions for overcoming the most crucial success and failure factors to enhance the viability of online grocery shopping in the Netherlands that have implications for different stakeholders. The conclusions of every contribution are elaborated in sections 8.1.1-8.1.3. The results of this thesis are also useful for practical purposes in designing, evaluating and enhancing online grocery shopping business models from the perspective of different stakeholders.

#### 8.1.1 Conclusions of the usefulness of the MAMSFFMCA

The MAMSFFMCA has been a useful tool to engage stakeholders and experts in efficiently identifying success and failure factors of online grocery shopping, to propose alternatives and to evaluate them. As opposed to the MAMCA or the MCA, the MAMSFFMCA has offered structured guidelines to identify alternatives. For this thesis, the MAMSFFMCA was used to identify alternatives that can directly enhance the viability of the online grocery shopping system based on the most important success and failure factors. Three methods have been used to identify the alternatives: 1. semi-structured interviews with experts and stakeholders 2. A creative brainstorm session, and 3. from the point of view of the researcher. From 16 interviews, around 30 objectives of 4 types stakeholders (grocery retailers, customers, government and deliverer), 60 success factors, 100 failure factors and 70 initial alternatives were gathered. The brainstorm session has also led to more than 40 alternatives. The researcher has identified solutions for every crucial success and failure factor. Thus, for other researchers, stakeholders and every other person, the MAMSFFMCA can be used to have a structured way of identifying many solutions in different settings as opposed to the MAMCA.

Besides, another main benefit of the MAMSFFMCA compared to the MAMCA and MCA, is that the solutions of the MAMSFFMCA do tackle the most important success and failure factors. This will make the solutions more effective in enhancing the adoption of a certain innovation. Besides, by applying the MAMCA and MCA, the solutions will only be evaluated on the objectives. However, the MAMSFFMCA also allows to evaluate the solutions on the most crucial success and failure factors. For this thesis, the MAMSFFMCA has allowed to select the best solutions for enhancing the viability of the online grocery service innovation, while the MAMCA only would have determined the best solutions on the stakeholders' objectives.

Besides the fact that the MAMSFFMCA provides the stakeholders and experts a tool to efficiently evaluate the solutions on both the stakeholders' objectives and the most crucial success and failure factors, the MAMSFFMCA also allows them to have an effective discussion about the best solutions to overcome the most important success and failure factors as opposed to the MAMCA. For this thesis, around 10 objectives, 25 factors, 60 alternatives (of which 20 on the effectiveness) have been evaluated during an interview and a survey. After the evaluation, the results have been discussed and validated with an independent researcher and bricks-and-clicks company. These discussions were based on different opinions on certain factors or alternatives that were easy to compare with this method.

### 8.1.2 Conclusions of the success and failure factors of online grocery shopping in the Netherlands

In this thesis, a new framework has been designed to analyze the identified success and failure factors. As opposed to the framework of Feitelson and Salomon (2004) and the explorative model of business model scalability by Stampfl et al. (2013), this framework was able to categorize all the identified success and failure factors on online grocery shopping. This framework has three pillars 1. core retail operations 2. other departments, and 3. external factors. 16 categories were distributed among these three pillars. Most of the identified success and failure factors are related to the category transport and delivery, which is one of the core retail operations. The interviewed pure players have mentioned mostly success factors than the bricks-and-clicks grocery retailers that mostly mentioned failure factors. This means that the Dutch bricks-and-clicks companies still face a lot of challenges within their online grocery shopping business models and that they can learn a lot from the business models of Dutch pure players.

The most crucial success and failure factors of the last mile delivery of online groceries in the Netherlands are related to challenges either to build scale, to keep customers satisfied, to efficiently and sustainably reach the (new) addresses of customers or to be more efficient at the customers' place. In order to build scale, it is very important to help customers to build a new habit of doing online grocery shopping as they are used of doing groceries in physical stores that are usually well-located. Besides, it is also important to notice that customers also don't like to do groceries in advance and that they are more cost conscience online than doing groceries in the stores. Of less importance is that customers are used of a certain brand or that they want to feel the fresh products or know the expiration date before buying the products.

In order to keep the customers satisfied, it is very important to offer time slots that suit the schedules of every customer specific, to have the products or substitutes available that the customers usually prefer, and to have a good communication to the customer about the accurate arrival time of the deliverer. These factors are much more crucial for the viability of online grocery shopping in the Netherlands than factors such as the opportunity to add products last moment or to have better recommendations for groceries that the customers might want.

However, according to a Dutch bricks-and-clicks grocery retailer, the most crucial challenge for the viability of online grocery shopping is to efficiently and sustainably reach the (new) addresses of customers. This conclusion is also strengthened by the fact that the rounded average scores of both a bricks-and-clicks grocery retailer and an independent researcher for the related success and failure factors were all indicating that the factors were either important or very important for the viability of online grocery shopping in the Netherlands. These efficiency factors are related to the lack of data of the (new) addresses, accurate routing information and experienced deliverers, but also the lack of opportunity to consolidate deliveries of different grocery retailers. Due to the investment costs, the range and volume limits of electric vehicles, and sometimes the lock-in of a fleet of unsustainable vehicles, it might be difficult to reach the (new) addresses in a sustainable way.

As opposed to these strategic factors, factors related to the challenge to be more efficient at the customer's place are more operational, which is also important for the viability of online grocery shopping in the Netherlands. The most important factor to overcome this challenge is to have good trainings and evaluation procedures for deliverers which will also help prevent unsafe and impolite behaviors. Deliverers can be more efficient if a more efficient way of finding groceries in the vehicles or an efficient payment system is provided. Besides, deliverers will also save time if they do not have to deliver until the kitchen that for example Albert Heijn and Jumbo offer as a service. This prevents more time with talkative customers. Customers can also make this process more efficient by having the bottles and crates ready for the deliverer.

### 8.1.3 Conclusions of the solutions to enhance the viability of online grocery shopping in the Netherlands

In order to overcome these success and failure factors, solutions have been proposed that requires the involvements of certain stakeholders and that will impact stakeholders' objectives. The best solution for building scale is to offer flexible subscriptions that can easily be terminated. Besides the fact that this is profitable for grocery retailers, this will also offer ease for customers and lower costs. Another solution that enhances the ease for customers and will lead to profitability for grocery retailers is to offer same day delivery for people who don't know what to eat at locations where a lot of people work or come together. This will enable delivery companies for meals that already have a network for same day delivery like Thuisbezorgd.nl and Deliveroo to infiltrate the market. By having more scale and new habits of customers, this might lead to routine deliveries for deliverers that will lead to a "personal" delivery service for customers. This will enable many other services that can not only be beneficial for grocery retailers and customers, but also for other stakeholders. This might for example lead to opportunities for delivery companies like PostNL and governments to collaborate to enhance the efficiencies of return shipments of packages or other products. Besides, a collaboration with governments can also be useful for getting subsidizes for using electric vehicles or other facilities for long-term sustainable return policies. For this, it is important that governmental objectives are prioritized by the grocery retailers.

Two solutions that are developed by Amazon have shown potential in enhancing the viability of online grocery shopping in the Netherlands. A solution that has scored the highest on almost all the most important objectives of grocery retailers, governments, customers and deliverers, are the Amazon boxes for 'not at home' delivery including cool boxes that will mainly overcome the challenge to keep the customers satisfied. Besides, this solution will allow a much more efficient and sustainable last mile delivery and more comfort for deliverers. A solution that might enhance the satisfaction of customers with online grocery shopping, is the one-click check out to add last moment products. However, this

solution will lead to less efficient planning and thus more costs for both grocery retailers and customers.

A solution that will enhance the efficiency and sustainability of the delivery to the (new) addresses of customers are tools that are suitable for using planning algorithms based on real-time data and historic data, which will enhance the punctuality and the cost-effectiveness of last mile delivery. For this, it is important to collaborate with technology companies that can create the right algorithms and tools. These technology companies will also play a crucial role in order to enhance the efficiency at the customers' place, since the best scoring solution is to help developing smart packages or to make more use of the CRM system that can send a message to customers on the moment they receive the estimated arrival time and one when the deliverer is leaving the previous customer to bring bottles and crates to reimburse money when the deliverer almost reached the address. This might lead to lower costs for the grocery retailers. Besides, this also offer other opportunities to use a rating system and an opportunity to give tips to the deliverer, which will be evaluated by the team leaders and can lead to more standardized paid trainings in a classroom which is (partly) financed by the tips. This is convenient for deliverers, since they get an incentive to take the trainings and improve. Besides, this also provide a better service for the customers.

## 8.2 Discussion of the Limitations of the MAMSFFMCA and the Research

This thesis started with a literature review for finding a suitable framework followed by developing and taking the steps of the MAMSFFMCA framework that faced certain limitations and raised several points for discussion. Most of the limitations and point of discussions are related to "time constraint", "representativeness", "Accenture bias", "confidential information" and "researcher's influence". These are thus written in cursive in order to improve the readability. The development and usefulness of the MAMSFFMCA framework are discussed in section 8.2.1. The execution of the method has led to certain conclusions for the viability of online grocery shopping in the Netherlands which are discussed for every step in section 8.2.2. This also leads to certain discussions of the steps of the MAMSFFMCA method.

### 8.2.1 Discussion of the development and usefulness of the MAMSFFMCA

Due to *time constraints*, the literature review for this thesis only focused on papers related to the last mile delivery of online grocery delivery and frameworks provided by the professors of the university of TU Delft, which might have led to a smaller scope of frameworks that have been suitable for analyzing the success and failure factors. It should also be noted that not all the papers explicitly mentioned the presented factors as success or failure factors, which might have led to certain factors that might not be success or failure factors. The interpretation of the results was based on the researcher's perspective, which might have been biased. On the other side, none of these limitations have led to wrong identified knowledge gaps, which means that it does not have complications for the rest of the thesis. For designing a new method for incorporating success and failure factors in the identification and evaluation of alternatives, only the MCA and MAMCA were considered as evaluation method for starting point by the *researcher*. Other evaluation methods such as cost-benefit analysis (CBA), cost-effectiveness analysis (CEA) or risk analysis could also have been employed as starting point (Eales et al., 2005). This might have led to another method that would have led to different results.

The MAMSFFMCA has been applied for the first time on identifying and analyzing the success and failure factors of online grocery shopping in the Netherlands and, proposing and evaluating solutions to enhance the system. However, it does not provide certain guidelines and the best methods for executing every step yet due to *time constraints*, the lack of expertise and the lack of experience as

opposed to the MAMCA that has been applied in different fields and has been supported and improved by various researches (Macharis, et al., 2012; Macharis & Bernardini, 2015). Besides, the MAMCA is compared to the MAMSFFMCA also less time consuming to conduct, since it does not have the steps of identifying, analyzing and evaluating solutions.

On the other side, the MAMSFFMCA stands out in three aspects compared to the MAMCA and other MCA methods: 1. it offers structured guidelines for identifying effective solutions that tackle the most important success and failure factors, whereas it remains quite vague how to identify solutions in the MAMCA or other MCA methods 2. it not only evaluates the solutions on objectives as in the MAMCA and MCA, but also on the most crucial success and failure factors for a viable system, and 3. the MAMSFFMCA also allows the stakeholders and experts to have an effective discussion on the best solutions for every success and failure factor, whereas the MAMCA and MCA only allows to compare the solutions based on the scores on the objectives.

Besides, the MAMSFFMCA also provides a structured method for identifying, analyzing and evaluating success and failure factors. Compared to other SFF frameworks, the MAMSFFMCA 1. not only identifies success and failure factors in a structured way, but also evaluates these factors by assigning weights, and 2. not only analyze success and failure factors, but also propose adequate solutions to cope with these crucial factors. Thus, the MAMSFFMCA has strengthened both the evaluation methods as the SFF frameworks by combining these.

#### 8.2.2 Discussion of every step of the MAMSFFMCA and application on the Dutch online grocery shopping system

In this section, both the methods used as the results of the Dutch online grocery shopping system are discussed for every step of the MAMSFFMCA.

##### Step 1. Stakeholder identification

The first step of the MAMSFFMCA was the identification of stakeholders and the interviewees which has led to many implications for the rest of the thesis. For identifying stakeholders, a stakeholder analysis has been conducted based on both primary resources such as interviews with (operational) stakeholders and experts, and secondary resources such as (news) articles, website pages, online grocery order apps and year reports. However, findings from the secondary resources have not been validated with the stakeholders or experts which was due to *time constraints* and the *lack of willingness to share confidential information* of the stakeholders and certain independent researchers. This might have led that not all the stakeholders are identified and that not the most accurate information was elicited. However, the results do provide a broad overview of the current Dutch online grocery system and most of the stakeholders involved. Besides, it also provides a comparison of the three largest parties Albert Heijn, Jumbo and Picnic that goes further in-depth than other analyses on these online business models.

Besides, the selection of the four key stakeholders (grocery retailers, customers, deliverers and governments) for the evaluation process were based on interviews with Accenture experts and independent researchers. However, not all the experts and researchers agreed on the same set of key stakeholders. This should have been validated with all the experts and stakeholders that were interviewed. However, this was not possible due to the *busy schedules* of the interviewees and the different opinions on the set of key stakeholders. This means that the selected set of stakeholders' specific objectives might have been different, which means that the solutions were scored on other objectives, which might have changed the results. Besides, 5 Accenture experts, 2 independent

researchers, 3 operational employees, 4 grocery retailers and only 1 civil servant were interviewed. This means that the results had a huge *Accenture bias*. This is explained since Accenture experts were easier to reach than other experts and stakeholders. Besides, some other experts and stakeholders were not willing to help due to *confidentiality reasons*, *time constraints* or just the lack of willingness to help. Also, not all the interviewed stakeholders had a function that provided them the best insights into the success and failure factors of their companies. More interviews with the grocery retailers that had important decision-making functions would have offered more accurate insights into the success and failure factors. Besides, more interviews with every stakeholder group would also have enhanced the reliability of the identified objectives and factors. Besides, all the operational employees were working for one company, that is not representative for all the operational employees. This might have biased the objectives of the deliverers. Furthermore, the customer perspectives were provided by (*Accenture*) *experts*, which could have *biased* the results of the customers. This does not represent the opinions of all the Dutch customers, since these people have more knowledge on the service and might have a different income than the average customers. Besides, most of the interviewees were also working or living in the “Randstad” of the Netherlands which means a *low (or no) representativeness* of customers from the rural area. This also has led that only customers from Albert Heijn, Jumbo and Picnic were interviewed. This means an *underrepresentation* of customers from other grocery retailers. These customers might have had different objectives, which has implications for the results.

### Step 2. Stakeholder objectives identification

The selection of stakeholders and the objectives that should be involved in the evaluation process missed a guideline that explained why a certain stakeholder or objective should be involved. This might have led to certain *biases from the researcher* that influence the outcomes since the results were evaluated with the stakeholders’ objectives. This has led to an unbalanced set of objectives that involved 6 objectives of the grocery retailers and only 1 objective of deliverers. Besides the fact that some objectives were overlapping, the results might still not lead to the support of the deliverers for example. Besides, both low costs and profitability were involved in the evaluation process, that have a causal relation. This had led to a double weight for the same objective. However, since the grocery retailers are the most important decision-makers in this system, it makes sense that most of the objectives involved are from grocery retailers. This approach even enhanced the awareness of the objectives of other stakeholders, which might not be the case if the KPI’s of the grocery retailers were used. Thus, the results might even lead to a higher acceptability by other stakeholders than by if only the KPI’s of the grocery retailers were used.

### Step 3. Success and Failure Factors (SFF) identification

A SFF framework was missing that suits the MAMSFFMCA in analyzing the identified success and failure factors. This thesis only used a self-developed framework, that might not have been the best framework. The self-developed framework to categorize the factors did not exclude hybrid factors to belong to several categories. This might have led to the wrong categorization of factors by the *researcher*. However, the framework has been very useful for categorizing the approximately 170 success and failure factors that has helped in selecting the most crucial factors. Also, criteria for identifying success and failure factors should have been provided. This would have led to success and failure factors of the same level. In this thesis, some were at a very strategic level, while others were at an operational level. The same problem occurred with the selection and evaluation of the results. This has made the comparison and evaluation between the factors and the alternatives a lot more difficult. This had biased the results that the *researcher* only chose the most concrete factors, whereas vaguer factors might have had led to more creative solutions.

Besides, the success and failure factors from certain customers that were not *represented* (e.g. from the rural area) might have been unidentified. Furthermore, not all the interviewees have provided both success and failure factors, that could have biased the results. This was due to the *lack of time* or the lack of inspiration to provide the factors. Ideally, every interviewee had named the same number of objectives, success and failure factors, and alternatives. Furthermore, no companies have been interviewed that operated a not viable online grocery shopping business model. These companies would have been able to provide much more failure factors. Also, no objectives, success or failure factors were identified from all the types of grocery retailers from start-ups to established grocery retailers. These companies face different challenges, which could have led to a broader result. However, the collected set of success and failure factors was already very extensive. Thus, more interviews would have made the results unclear.

#### Step 4. Means exploration and alternatives identification

In this thesis, solutions were elicited from interviews, a brainstorm session and from the expertise of the researcher. *Due to time constraints*, the solutions during the interviews were held in the same session as gathering the data for the objectives, success and failure factors, which has led to solutions that were not designed for a specific success or failure factor. From the interviews, better solutions might have been gathered if it was divided into two interviews. The brainstorm session was held with the value office team within Accenture. This has led to an *Accenture bias*. Furthermore, the researcher has provided one third of the solutions for the evaluation process due to *time constraints*, which has led to a large *researcher's influence*. Ideally, these solutions were brainstormed with stakeholders that could implement the solutions in order to know whether a certain solution will be considered or feasible.

This has led to solutions that were not comparable, since certain solutions were very strategic, while others were very operational. Therefore, it is important to provide more guidelines for eliciting solutions to come up with solutions of the same level. Besides, by using the same method, this could also have been prevented. On the other side, this thesis has offered a broad selection of solutions due to the use of three types of methods, which is also beneficial since it can be interesting for different stakeholders to see how well certain solutions have been scored.

#### Step 5. Weight the objectives and the SFF's

For this thesis, it was chosen to let the interviewees score everything on a 5-point Likert Scale due to *time constraints*. The weighting was done with only 1 grocery retailer and 1 independent researcher with customer perspective. This is not *representative* for either the grocery retailers or the customers. Besides, the opinions diver a lot of these two interviewees, which means that the results are not very robust. Besides, since not the same alternatives were preferred, this had led to some solutions that were only scored by one stakeholder and another by two stakeholders (average score was taken) that made it not fair to compare the solutions with each other. This has contributed to *representativeness issues* of only using two interviewees to weight. Furthermore, as opposed to direct rating, pairwise comparison methods such as Analytic Hierarchy Process (AHP) or Best Worst Method (BWM) could have revealed a certain ranking among the objectives (Baudry, et al., 2014; Rezaei, 2015a and Rezaei, 2015b). Thus, other methods could have been better employed to get more reliable data. Therefore, the results should not be used as objective data, but rather as subject of discussion and to create a certain point of view. Besides, it has also been used for a certain validation of the results on the objectives and success and failure factors.

### Step 6. Scoring alternatives against weighted objectives/SFF's

Due to *time constraints* and the fact that less stakeholders wanted to help due to *confidential* information, the two interviewees were asked to fill in an extensive questionnaire. In these questionnaires, the alternatives were therefore not described very detailed and unambiguously. This means that certain alternatives were interpreted differently and thus, scored differently. Besides, if interviewees were able to score with the scale -2 till 2 instead of 1 till 5, this might also have led to different results. Also, the evaluation was done with only 1 grocery retailer and 1 independent researcher with customer perspective. Therefore, the same *representativeness issues* as mentioned in step 5 occur.

### Step 7. Sensitivity analysis and stakeholder implications

For the sensitivity analysis, all the objectives' weights were assigned the same score due to *time constraints*. However, other sensitivity analysis e.g. scenario analysis (Hickman, et al., 2012), could have been employed that might have been more suitable for practical use than only changing the scores of the weights of the objectives. This might have led to a better evaluation for the robustness of the solutions. Besides, a feasibility analysis is missing for implementation of the solutions. It is difficult to determine the next steps based on the MAMSSFFMCA. Lastly, the implications on the stakeholders were given from a *researcher perspective* instead of the result of an interview with the stakeholders. This might have led to more concrete stakeholders that could have helped or be impacted by the proposed solutions. However, the given stakeholder implications can be used as a first exploration of the stakeholders and the direction to find stakeholders to collaborate with for implementing certain solutions.

## 8.3 Recommendations for future research on the MAMSSFFMCA and the online grocery shopping in the Netherlands

Based on the conclusions and the discussions, it becomes clear that the MAMSSFFMCA has proved its added value for both the scientific literature as the practical use. However, the method can be improved on several aspects and there are still certain parts of the viability of the Dutch online grocery shopping market unexplored.

Firstly, an extensive literature research or the involvement of researchers with the expertise of success and failure factors or evaluation methods should lead to better methods and frameworks for identifying success and failure factors, eliciting solutions, for weighting and scoring the results and for doing a sensitivity analysis. For finding frameworks to identifying success and failure factors, also other field of researches should be explored than the last mile deliveries. Besides, the self-developed SFF framework for analyzing the success and failure factors of last mile delivery can be improved by adding more subcategories to the "transport and delivery" category. In order to find better methods for eliciting solutions, more research should be done into design thinking methods. Also, better use of secondary resources and interviews should be made. If an efficient method for selecting a smaller size of success and failure factors, objectives and solutions, a mixed method of MCA techniques such as Analytical Hierarchy Process (AHP) and the Preference Ranking Organisation MeTHod for Enrichment Evaluations (PROMETHEE) can be used for weighting criteria, just as proposed by Machariset al. (2004) for the MAMCA. Also, the pairwise comparison method Best Worst Method (BWM) could be used for a certain ranking among the objectives (Rezaei, 2015a and Rezaei, 2015b). Compared to AHP, the BWM stands out for its simplicity and reliability by only using two vectors of pairwise comparisons (Rezaei, 2015a). A way to enhance the robustness of the solutions combined with a MCA method is to use scenario analyses (Hickman, et al., 2012).

Secondly, guidelines and rule of thumbs should be provided for every step. This will allow to make better comparisons and selections of the most crucial stakeholders, objectives, success and failure factors, and the best solutions. This should prevent the researcher's influence on the results. Besides, this will also improve the comparability of the identified success and failure factors and the solutions. For this literature studies into every step should be conducted to find the best rules and guidelines. Thirdly, in order to know what method works best, what guidelines and rule of thumbs are the most applicable and to explore the applicability of the MAMSFFMCA framework, this framework should be applied in other field of researches as well. This will enhance the experience and will lead to incremental improvements of the MAMSFFMCA.

Recommendations for future research in the field of online grocery shopping in the Netherlands are based on better representativeness of the Dutch stakeholders, more complete and better list of success and failure factors, better solutions and next steps. It is important that future research will involve diverse and more stakeholders e.g. more customers that are not experts and other stakeholder groups, in the identification of success and failure factors and the evaluation of the solutions. This will offer more reliable results. Besides, also stakeholders that both really failed in online grocery shopping in the Netherlands e.g. representatives of Stockon, should be involved, in order to receive more and perhaps better failure factors. Besides, also more in-depth interviews should be held with stakeholders that have an important function at a grocery retailer that has been successful e.g. Picnic, that knows all the strategies of a certain company. This will enhance the number and quality of success factors. For eliciting solutions, a brainstorm session should be held with stakeholders that can implement solutions. This will enhance the chance that solutions are proposed that will be feasible and implemented. The next steps are to involve stakeholders that can determine whether the proposed solutions are feasible or interesting to implement. These stakeholders might help to evaluate the solutions on the objectives with objective quantified data in order to enhance the reliability of the solutions. Besides, also the list of other success and failure factors in appendix F should be considered in order to determine whether other crucial success and failure factors can be identified. The same must be considered with the solutions in the appendices G and L in order to determine other solutions that have high potential to improve the viability of online grocery shopping in the Netherlands.

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## Appendix A. Scientific Paper

### Reviewing the use of Success and Failure Frameworks for analyzing the Adoption of Innovations: Proposing a Multi-Actor Multi-Success-and-Failure-Factors Multi-Criteria Approach (MAMSFFMCA)

Yip. K. H.<sup>1</sup>

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**Abstract** – Many innovations have never or only in limited form been adopted. Therefore, throughout the last decades, academics have been focusing on the success and failure factors (SFF) of the adoption of innovations. This success depends on the objectives of the engaged stakeholders. However, no comprehensive literature review exist that focused on the purpose of the SFF frameworks and the engagement in the innovation process of these frameworks. Therefore, the papers related to SFF frameworks and the adoption of innovations have been reviewed on these knowledge gaps. This review showed that no framework had been developed that engaged stakeholders for using weighted success and failure factors to propose and evaluate solutions to enhance the viability of innovations. Therefore, a multi-criteria approach called the Multi-Actor Multi-Success-and-Failure-Factors Multi-Criteria Analysis (MAMSFFMCA) has been developed and evaluated on a case about online grocery shopping in the Netherlands. This method has been a useful tool to engage stakeholders and experts in efficiently identifying success and failure factors of online grocery shopping, to propose alternatives and to evaluate them. The MAMSFFMCA method can be further developed by providing more guidelines and rule of thumbs that can be used for the data gathering, the selection procedures and the evaluations of every step.

**Keywords:** *Adoption of innovations, MAMSFFMCA, Multi-criteria analysis, Stakeholders Engagement, Success and Failure factors*

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#### 1. Introduction

Many innovations have been proposed, but never or only in limited form been adopted (Feitelson & Salomon, 2004). Asplund and Sandin (1999) and Cozijnsen et al. (2000) even argued that only 20 percent of the initiated projects of innovations were successful. It is important to understand that innovation doesn't necessary mean that something must be invented or that a new design must be made. Innovation is mainly about the clever application of ideas or existing inventions that create an added value for a company, an organization or a society (van Leeuwen, 2006). Among practitioners and academics all over the world, it is known that innovations are very important for firms, since it drives growth and higher profits (van der Panne, et al., 2003). However, the success or failure of the adoption of innovations are affected by certain success and failure factors (SFF) (Feitelson & Salomon, 2004).

Besides Feitelson & Salomon (2004), many academics have been focusing on assessing these factors, categorizing them and developing frameworks for analyzing the adoption of innovations (Geels, 2002; Hekkert, et al., 2007; Maidique and Zirger, 1984; van der Panne, et al., 2003; Weisenfeld, 2003; Widén, et al., 2014). Weisenfeld (2003) believes that innovations evolve by the influence of economic, cultural, social and political factors, while Geels (2002) states that such technological transitions influence changes in user practices, regulations, industrial networks, infrastructure, and symbolic meaning or culture given a dynamic multi-level perspective. Van der Panne et al. (2003) even conducted a

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literature review to capture a conclusive view on the most important SFF's in the literature by categorizing them in firm, project, product and market related factors. However, none of these papers provided a framework to propose solutions for influencing the innovations in order to enhance the success rate while according to Hekkert et al. (2007), "there is a strong need to influence both speed and direction of innovation and technological change".

This raises the question: What is meant with a successful adoption of an innovation? Traditionally, an innovation is a success if it has reached a certain financial return (Cooper & Kleinschmidt, 1987). However, according to Maidique & Zirger (1984) and Widén et al. (2014), it depends on the objectives that stakeholders want to achieve for a successful partnership, since the introduction of an innovation might lead to limited financial return but can still be considered as a success. For example, if the innovation has a major impact on the market or if it has opened an opportunity window without having a financial return (Cooper & Kleinschmidt, 1987). However, a significant proportion of partnerships fail to meet their objectives that can be the result of a missing structured process of engagement with stakeholders as an integral part of the innovation process (Widén et al, 2014). Besides, no literature review has been conducted yet that instead of reviewing the success and failure factors, focused on reviewing existing frameworks for analyzing the SFF's for the adoption of innovations.

Given these gaps, the aim of this research is twofold. Firstly, the literature on the SFF's that influence the adoption of innovations is reviewed on

1. The frameworks used in the papers
2. The purpose of focusing on the success and failure factors in the considered literatures
3. The stakeholder involvements in the innovation process

Secondly, based on this literature review, a framework is proposed that aids for filling the gaps of a missing structured method for engaging stakeholders in the innovation process that also involves a stage for the proposal of solutions to influence the direction of innovations given the set of objectives.

Chapter 2 focusses on the methodology, which is the literature search. Chapter 3 provides the results of the literature review on the three focuses areas. In chapter 4, an integrated framework called the Multi-Actor Multi-Success and Failure Factors Multi-Criteria Analysis (MAMSFFMCA) is presented. This has been applied on the 'online grocery shopping in the Netherlands' case, which is described in chapter 5. In the same chapter, the lessons learned from the application on the case has been used to evaluate the method. In chapter 6, the conclusions and recommendations for future research are provided.

## **2. Literature Review Method**

A literature review has been performed in order to capture all the literature about SSF's frameworks for analyzing the adoption of innovations. According to Van Wee and Banister (2016), "a literature review is a systematic, explicit, and reproducible approach for searching, evaluating, and interpreting the existing academic literatures." For this review, *Scopus* has been used to identify research papers, because "this abstract and citation database delivers the broadest overview of global interdisciplinary scientific information that has been reviewed and selected by an independent Content Selection and Advisory Board (CSAB)" (Elsevier, n.d.).

In order to capture the core concepts in the literature search in *Scopus*, the following brackets, Boolean operators and keywords are used for the initial search: success AND failure AND factors AND adoption AND innovations AND framework. The words "success", "failure" and "factors" are not combined as "success and failure factors", because this has led to zero results. This makes sense, since "success and

failure factors” is not a concept. By separating the words, both researches on success factors and failure factors are captured. Besides, the aim of the reviewed papers must be related to the adoption of innovations. Therefore, the words ”adoption” and ”innovations” are included. Furthermore, in order to understand how to incorporate success and failure factors in the proposal of innovative collaboration solutions in a structured way, a framework should be used. Therefore, the literature is reviewed on ”frameworks” related to success and failure factors and the adoption of innovations. This results in 38 research papers. However, 21 out of 38 papers are documents from the International/Americas conference on information systems that are assemblies of more than 300 papers, which are too time consuming to review. Besides, these conferences have a special focus on information systems, which is not the focus of this research. Therefore, these papers are excluded by adding ”AND NOT conference” to the search. This leads to a total of 17 papers that are reviewed (See table 1).

**Table 1.** List of reviewed research papers

	Reference	Document Title
1.	Hollick, et al. (2019)	Shaping innovation and coordination of healthcare delivery across boundaries and borders
2.	Audouin, et al. (2018)	Territory matters: Exploring the functioning of an innovation system through the filter of local territorial practices – the example of the adoption of cashew trees in Burkina Faso
3.	Chronopoulos & Lumbreras (2017)	Optimal regime switching under risk aversion and uncertainty
4.	Adeshina & Ojo (2017)	Factors for e-voting adoption – analysis of general elections in Nigeria
5.	Rumbo, et al. (2016)	Implementing evidence and implementation research: two different and prime realities
6.	Van de Kaa & de Vries (2015)	Factors for winning format battles. A comparative case study
7.	Sisaye & Birnberg (2014)	Sociological Approaches to Organizational Learning: Applications to Process Innovations in Management Accounting Systems
8.	Matengu & Ashekele (2010)	Impact of technology integration on olive farming in central Namibia
9.	Albano (2010)	Organizational readiness and success of the EHR-S adoption
10.	Ram & Swatman (2008)	Enterprise Resource Planning (ERP) Innovation Process: Towards Development of an Integrated Framework for successful Adoption and Implementation
11.	Green, et al. (2006)	Information system support as critical success factor for chronic disease management: necessary but not sufficient
12.	Ammenwerth, et al. (2006)	IT-adoption and the interaction of task, technology and individuals: A fit framework and a case study
13.	Chakravorti (2004)	The role of adoption networks in the success of innovations: a strategic perspective
14.	Russel & Hoag (2004)	People and information technology in the supply chain: social and organizational influences on adoption
15.	Kukafka et al. (2003)	Grounding a new information technology implementation framework in behavioral science: a systematic analysis of the literature on IT use
16.	Tettyey (2000)	Computerization, institutional maturation, and qualitative change: Analysis of a Ghanaian public corporation
17.	Chan & Yung (1999)	Assessment of individual, organizational and environmental variables in the implementation of business process redesign

### **3. Findings and Discussion**

The 17 documents retrieved from the literature search (See table 1) are reviewed in order to find out what frameworks have been used, what the purpose of the papers were by focusing on the success and failure factors, and the stakeholder involvements in the innovations process. The description of the purpose of the papers and the use of success and failure factor frameworks are presented in table 2. The categorizations of the purposes and the used frameworks are presented in table 3. This is followed by the presentation of the findings on involvement of stakeholders in the innovation process in table 4. For the latter, it is presented which papers mentioned 'stakeholder', at which stage of the paper and how, in order to determine the involvement of stakeholders in the innovation process. These findings are discussed.

**Table 2.** Extended description of the purpose of the papers and the use of SFF's

	Reference	Purpose of the papers and the use of SFF frameworks
1.	Hollick, et al. (2019)	The purpose of the analyses was to understand why introduction of a mobile service delivery model met with variable success in diverse countries and organizations by comparing successful and unsuccessful cases. This filled the gap of a lack of adequate methodologies for the implementation and evaluation of interventions in the healthcare.
2.	Audouin, et al. (2018)	The main functions of innovation systems (success factors) were used to develop an approach to identify key players and their practices in order to focus on the interactions between territorial specifications and the systems of innovations.
3.	Chronopoulos & Lumbreras (2017)	It is unknown how market incompleteness influences attitudes towards risk, and, in turn, incentives for technology adoption. Therefore, this paper focused on how economic and technical uncertainty can influence incentives for technological change.
4.	Adeshina & Ojo (2017)	The purpose of this paper was to analyze the success and failure factors to build theory in the adoption of e-voting and to provide a checklist of success and failure factors for the adoption of e-voting innovations, since only little research has been focusing on the success and failure factors on the adoption of e-voting
5.	Rumbo, et al. (2016)	In the field of nursing, best practice implementation experiences have increasingly been used, leading to an increased number of studies on this topic. So, a comprehensive study of these studies is missing. Therefore, the purpose of the analyses on success and failure factors of implementation is to enhance the effectiveness and equitability of the implementation of evaluated scientific research in order to improve the health of a population.
6.	Van de Kaa & de Vries (2015)	There is a lack of empirical research on success and failure factors of format dominance. So, this paper focused on how firms can use these factors to understand and enhance the success of their strategy.
7.	Sisaye & Birnberg (2014)	The purpose of understanding the success and failure factors of management accounting innovations is to enhance an organization's strategic position against its competitors. Therefore, the organizational learning framework has been extended.
8.	Matengu & Ashekele (2010)	There has barely been emphasis on the success and failure factors of technology integration. These factors can be used to explain the adoption of innovations.
9.	Albano (2010)	The lack of research on the individual and organizational factors that influences the EHR-S adoption. Identifying the success and failure factors will help getting the internal environment more ready for the adoption of the innovation.
10.	Ram & Swatman (2008)	A more structured and comprehensive research for the identification of critical success factors is missing in the literature. Besides, little is known about the critical success factors and its relationship with the impact that these factors have on the performance of the firms. Lastly, little research has been conducted on the decision stage in the process of innovation. Therefore, the identification of the critical success factors will enhance the chance to adopt ERP projects.
11.	Green, et al. (2006)	Critical success factors have not been identified yet for implementing clinical and operational knowledge on efficient and effective chronic care management in primary care practice. Thus, the factors have been identified in order to rapidly implement and achieve care improvements.
12.	Ammenwerth, et al. (2006)	Existing IT adoption frameworks did not include the interaction between user and task, which is very important. This will enable better prepared and more successful results of the adoption of IT projects.
13.	Chakravorti (2004)	The success and failure of an innovation is mainly due to the adoption network, which is not very well understood now. These factors will have implications in the planning and managing of the adoption of innovations by policymakers and strategists.
14.	Russel & Hoag (2004)	Understand people and their acceptance for technology in order to reduce the failure of IT innovations, since there is a lack of research about social and organizational influences that impact the acceptance of IT supply chain innovations by the users.
15.	Kukafka et al. (2003)	There is a knowledge gap between the IT implementation and the use of scientific models and theories to develop multi-level approaches to identify factors that influences the behavior of the users. These factors will contribute to the understanding why it is very difficult to implement IT interventions and why there is a need for continue develop more insights.
16.	Tettyey (2000)	No recognizable studies on feasibility of computerization in the VRA have been carried out so far. These factors could hinder the effective use of ICTs.
17.	Chan & Yung (1999)	The SFF's are useful for exploring BPRs. Therefore, structured framework is needed for producing a sound analysis of a business process reengineering process.

**Table 3.** Used frameworks and categorization of the main purpose of the papers

	Reference	Description of Used Framework	Category of purpose paper	
			Analyzing SFF's	Developing framework
1.	Hollick, et al. (2019)	The Non-adoption, Abandonment, Scale-up, Spread and Sustainability (NASSS) framework was used for exploration. It has been used to compare case studies and to study interactions of contextual factors that influences the introduction and sustainability of services.	X	X
2.	Audouin, et al. (2018)	Integrated framework of technological innovation systems (TIS) structures and functions coupled with territorial practices		X
3.	Chronopoulos & Lumbreras (2017)	A utility-based, regime switching framework has been developed for evaluating different technology-adoption strategies.	X	
4.	Adeshina & Ojo (2017)	An analytical framework based on the combination of existing e-voting adoption models and multi-level innovation adoption model has been used to analyze observations and post-election reports.	X	
5.	Rumbo, et al. (2016)	Key frameworks have been identified: Determinant frameworks and evaluation frameworks.	X	
6.	Van de Kaa & de Vries (2015)	A new framework of success and failure factors of format dominance has been developed in order to improve the understanding on this topic, to make more accurate forecasts about the winner and how to adjust the strategies by exploiting certain factors.	X	
7.	Sisaye & Birnberg (2014)	The organizational learning framework had been used to improve the understanding on the success and failure factors of management accounting innovations	X	X
8.	Matengu & Ashekele (2010)	The existence of a supportive policy and institutional framework will contribute to successfully adopt a new technology.	X	
9.	Albano (2010)	A conceptual readiness framework that supports the analysis and diagnosis of the preparation of the organization to adopt EHR-S.	X	
10.	Ram & Swatman (2008)	Integrated framework for successful adoption and implementation of ERP.	X	X
11.	Green, et al. (2006)	Quality improvement framework for translating direct critical success factors into primary care.	X	
12.	Ammenwerth, et al. (2006)	"Fit between individuals, task and technology" framework was developed to analyze the process of IT adoption during the implementation phase.	X	X
13.	Chakravorti (2004)	A framework that captures the adoption network in order to determine what relevant players are involved, whose choices are crucial to coordinate, and what mechanism should be used to coordinate.	X	
14.	Russel & Hoag (2004)	The diffusion of innovation theoretical framework in order to understand and analyze challenges in the implementation of IT innovations.	X	
15.	Kukafka et al. (2003)	Integrated framework serves to scope, to identify variables and then to make the relationship explicit.	X	X
16.	Tetty (2000)	Social interactionist conceptual framework has been used to analyze computerization of a public corporation.	X	
17.	Chan & Yung (1999)	The structured framework is helpful for the analysis of practitioners.	X	X

**Table 4.** Findings on stakeholder involvements

Reference	'Stakeholder' mentioned	At which stage of the paper?	How?
1. Hollick, et al. (2019)	X	Result	As identified factor that it is important to generate and sustain the motivations of key stakeholders in innovations
2. Audouin, et al. (2018)	X	Result of literature study	Part of description of innovation system functions
3. Chronopoulos & Lumbreras (2017)			
4. Adeshina & Ojo (2017)	X	Result	As key factor to involve stakeholders
5. Rumbo, et al. (2016)			
6. Van de Kaa & de Vries (2015)	X	Result of literature study	As key factors for format dominance
7. Sisaye & Birnberg (2014)			
8. Matengu & Ashekele (2010)			
9. Albano (2010)	X	Result of defining success	Stakeholder satisfaction as an important objective for determining success
10. Ram & Swatman (2008)	X	Introduction	Developed framework can be used by the stakeholders in decision making
11. Green, et al. (2006)	X	Results	Stakeholders were part of a success factor
12. Ammenwerth, et al. (2006)			
13. Chakravorti (2004)			
14. Russel & Hoag (2004)			
15. Kukafka et al. (2003)	X	Evaluation	Defining needs and goals of stakeholders for assessing technologies
16. Tetley (2000)	X	Results of literature study	Managers that become stakeholders in projects that they got involved in
17. Chan & Yung (1999)			

In table 3, most of the reviewed papers used frameworks to analyze the success and failure factors of implementing or adopting a certain innovation (Adeshina & Ojo, 2017; Albano, 2010; Ammenwerth, et al., 2006; Chakravorti, 2004; Chan & Yung, 1999; Chronopoulos & Lumbreras, 2017; Green, et al., 2006; Hollick, et al., 2019; Kukafka et al., 2003; Matengu & Ashekele, 2010; Sisaye & Birnberg, 2014; Ram & Swatman, 2008; Russel & Hoag, 2004 and Van de Kaa & de Vries, 2015). Sisaye, Birnberg (2014), Van de Kaa and de Vries (2015) agree that a better understanding of success and failure factors for innovations will enhance the success of a strategy. Ngai et al. (2008) say that the identification of critical success factors can help organizations to study the conditions for determining solutions to reduce or avoid failure factors in the pre-adoption and implementation environments and thus enhance the chance of successfully implementing an Enterprise Resource Planning project. Ram and Swatman (2008) even provided a theoretical framework to enhance the chance to successfully adopt Enterprise Resource Planning projects (See table 2). Besides exploration of factors, some other researches focused on the lack of adequate methodologies or frameworks (Ammenwerth, et al., 2006; Chan & Yung, 1999; Hollick, et al., 2019; Kukafka et al., 2003; Sisaye & Birnberg, 2014 and Ram & Swatman, 2008). Ammenwerth et al. (2006) developed a framework to help analyze success and failure factors for the adoption of IT innovations in a healthcare setting based on a case study and literature study. This means that both these methods are very useful for developing a framework to analyze success and failure factors of innovations. It is also important to know that more flexible, nuanced and pluralistic approaches are needed to guide the implementation and the evaluation of interventions in complex sectors like the healthcare (Greenhalgh et al., 2018). Hollick et al. (2019) used the Non-adoption, Abandonment, Scale-up, Spread and Sustainability (NASSS) framework to help coordinate healthcare services from different perspectives by using it to analyze data. However, this method lacks in actual proposing and quantitatively evaluating the solutions. The method rather helps to create

narratives for opportunities and threats. Kukafka et al. (2003) made a framework that is useful for the implementation phase. The researches of Chan & Yung (1999) and Rumbo, et al. (2016) also focused on the implementation phase. However, almost no research has been focusing on involving success or failure factors in the design or evaluation phase in the decision-making process. Only Van de Kaa and de Vries (2015) used a framework of factors to make forecasts about the winners of format battles and how their strategies could be adjusted by exploiting certain success or failure factors. However, one of the identified limitations is that all these unique factors have the same weight, while it might be true that some are more important than others. Van de Kaa and de Vries (2015) proposed to examine this by using multi-criteria analysis (MCA) methods e.g. analytic hierarchy process (AHP). Although they proposed this to assess the importance of factors for format dominance only, this implies that a method is still needed to determine whether some crucial success and failure factors are more important than others and how the results of the analysis on success and failure factors can lead to (new) solutions.

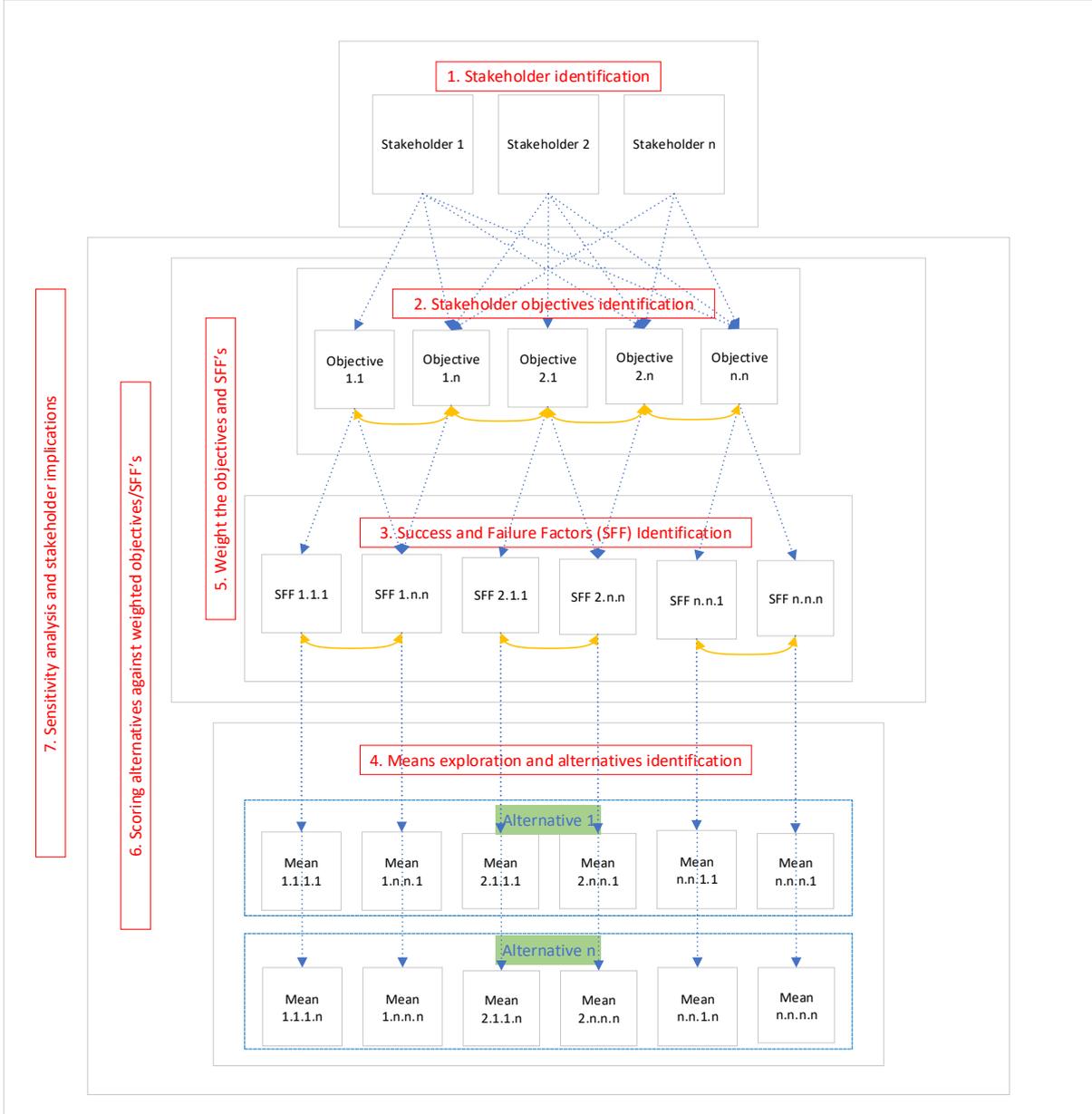
Besides, out of 9 papers that mentioned stakeholders in table 4, only Kukafka et al. (2003) had involved stakeholders in the evaluation process by determining their needs and goals for selecting the most suitable technologies (Adeshina & Ojo, 2017; Albano, 2010; Audouin, et al., 2018; Green, et al., 2006; Hollick, et al., 2019; Kukafka et al., 2003; Ram & Swatman, 2008; Tettey, 2000; Van de Kaa & de Vries, 2015). However, Kukafka et al. (2003) do not offer a structured way of how to involve stakeholders and their needs and goals. Besides, most of these papers do recognize that involving key stakeholders will help to lead to a successful adoption of innovations (Adeshina & Ojo, 2017; Albano, 2010; Green, et al., 2006; Hollick, et al., 2019; Kukafka et al., 2003; Van de Kaa & de Vries, 2015). Thus, there is a practical gap in the literature that offer a structured way of involving stakeholders in the innovation process.

#### **4. A new approach: Multi-Actor Multi-Success-and-Failure-Factor Multi-Criteria Analysis (MAMFFMCA)**

Given the results of the literature review on the use of SFF frameworks for the adoption of innovations, it becomes clear that SFF frameworks have not been used in the design or evaluation phase so far. However, by incorporating success and failure factors in these phases, proposed solutions are more viable. According to van de Kaa and de Vries (2015), MCA methods could be used to examine whether some success and failure factors are more important than others. MCA is used in researches to assess different alternatives against a set of criteria (Gerçek, et al., 2004). However, in the traditional MCA, only the objectives of one actor are involved, which still lead to a significant proportion of partnerships to fail, since not all their objectives are met (Widén et al, 2014). Therefore, a more interesting MCA method is the Multi-Actor Multi-Criteria Analysis (MAMCA). This MAMCA method does allow the incorporation of the objectives and opinions of different stakeholder groups in a structured way through the whole complex decision-making process which enhances the suitability and practicability of the outcomes compared to the traditional MCA methods (Macharis & Bernardini, 2015). The steps described by Macharis (2007) are as followed:

- Step 1: Defining the problem and the alternatives
- Step 2: Stakeholder analysis
- Step 3: Define criteria and weights
- Step 4: Criteria, indicators and measurement methods
- Step 5: Overall analysis and ranking
- Step 6: Result and sensitivity analysis
- Step 7: Implementation

There are different means in MAMCA methods to gather alternatives, criteria and their weights (Macharis & Bernardini, 2015). However, it remains quite vague and general how this process should be done in a reproducible way that also enhances the adoption of the innovative alternatives. Besides, it is also not clear how the success and failure factors can enhance the adoption of the proposed solutions. Therefore, a new integrated framework has been developed named the Multi-Actor Multi-Success-and-Failure-Factor Multi-Criteria Analysis (MAMSFFMCA). This framework is presented in figure 1. The developed integrated framework has the shape of a pyramid that follows the natural sense of doing an explorative research. It starts at the top where no or just a little is known about a problem (Brown, 2006). Every step is elaborated in more detail. Besides, also the lesson learned from the application on a ‘online grocery shopping in the Netherlands’ case is discussed for every step.



**Figure 1.** Integrated Framework of Success and Failure Factors with Multi-Actor Multi-Criteria Analysis

### Step 1. Stakeholder identification Step

The first step starts with the identification of the stakeholders. As defined by Freeman (2010), a stakeholder is 'an individual or group of individuals that are influenced by or can influence the achievement of organization's objectives.' Thus, it is first important to determine what parties can influence or are influenced by the system the most. This step is different from the traditional MAMCA approach, that identified stakeholders in step 2 after the problem definition and the alternatives identification. The reason why stakeholders should be identified first, is because early involvement of stakeholders helps to better understand the problem and the priorities of every party and thus enhance the acceptance of the proposed solution (Banville, et al., 1998).

### Step 2. Stakeholder objectives identification

The second step is to identify the objectives of every key stakeholder. The objectives of the stakeholders are used as criteria just as described by Macharis et al. (2012) for the MAMCA. As discussed in section 1, the measurement of a success depends on the objectives of the different stakeholders in the system. Overlap of these objectives can occur, since different stakeholders might have the same objectives. Therefore, it is important for the researcher to validate this with the stakeholders in order to avoid double counting. For eliciting the objectives, the questionnaire provided in appendix A can be used. The most important objectives can then be selected based on the frequency or the relevance. This leads to a list of objectives/criteria that are used for the evaluation process.

### Step 3. Success and Failure Factors (SFF) identification

The third step is to identify the SFF's for every objective. Success factors define desired conditions that has led to a successful achievement of an objective from which we can learn, while failure factors are undesired challenges that still needs to be overcome in order to reach a certain objective. By using these success and failure factors identified by involving different stakeholders for proposing solutions, the risk of failure of the adoption of the innovations are minimized (Ngai et al., 2008). These success and failure factors are related to objectives of the most important stakeholders identified in step 2. Every stakeholder is asked to determine key factors that has led to the (un)successful achievement of an objective. For this, the questionnaire in Appendix A can be used. For gathering success factors, interviewees are asked to explain how they successfully reached a certain objective. For gathering failure factors, interviewees are asked to explain why certain objectives are still not reached. These SFF's are then categorized and analyzed with a suitable SFF framework. From these, the most important ones must be selected based on the frequency or in collaboration with stakeholders and experts.

### Step 4. Means exploration and alternatives identification

The fourth step is to use the success and failure factors to propose new solutions. This step bridges the gap of the practical usefulness of analyzing success and failure factors and using it to design, measure, evaluate and propose (innovative) alternatives. As opposed to the MAMCA that used a pre-determined set of alternatives or performed an extensive literature overview for determining alternatives followed by a feasibility screening (Macharis et al, 2012), the MAMSFFMCA is more suitable for explorative research where there is not a pre-determined set of alternatives or barely any previous research and literature. As can be seen in the same questionnaire in Appendix A, the analysis of success and failure factors leads to the identification of means for the alternatives. Thus, these alternatives are based on the lessons learned from the success factors and have means that avoid the failure factors. Ideally, this part of the questionnaire is filled in after having a final list of objectives, success and failure factors.

This is in the form of a morphological chart, that is a tool to help generate alternatives by identifying means for each function that a system must have (Dym, et al., 2014). See appendix A for the adapted questionnaire based on the morphological chart. This is also used during a brainstorm session or by the researcher to elicit alternatives. After generating the objectives, the SFF's, the alternatives, a final set of alternatives must be selected based on how likely the alternative can overcome the identified failure factors or make use of the success factors. This has led to the bottom of the pyramid since all the qualitative data has been gathered (see figure 1).

#### Step 5. Weight the objectives and the SFF's

In the fifth step, the gathered data are taken together to compute the analysis. Therefore, in figure 1, these steps are displayed as combinations of the previous steps. The fifth step focused on giving weights to the objectives/criteria and the SFF's. For the MAMSFFMCA, the list of most important identified success and failure factors are used to choose the best solutions, since these factors are crucial for the adoption of the innovation. These factors are thus first weighted. The method also allows us to make use of hierarchical clustering of the success and failure factors per key question related to the success and failure factors. This enables the opportunity to make use of a mixed method of MCA techniques such as Analytical Hierarchy Process (AHP) and the Preference Ranking Organisation MeTHod for Enrichment Evaluations (PROMETHEE) (Macharis, et al., 2004). Also, a 'Direct Matrix Ranking' (DMR) can be used to score the objectives, the success and failure factors on a 5-point Likert Scale instead of a ranking, see appendix A (Chambers, 1998).

#### Step 6. Scoring alternatives against weighted objectives/SFF's

In step 6, the weights of step 5 are used to assess the alternatives. For this, the analyst, the expert or the stakeholders can score the alternatives on the criteria. This depends on the expertise that every party has on the problem. Besides, the stakeholders may have a strategic bias, since their objectives and identified factors are involved (Macharis, et al., 2012). The alternatives can also be scored against the success and failure factors on a 5-point Likert Scale. In this way, for every success or failure factor, it becomes clear which alternative is the best to adapt. If alternatives have the same rating, then the interviewee can be asked to determine the best alternative. Besides, the interviewee can argue 1. why he or she give a certain rating to an alternative, 2. How the alternatives can be improved and 3. What his point of view is about an alternative besides the rating on likelihood. This enhances the quality and completeness of the alternatives. These rates can then be multiplied with how important a success or failure factor is in order to determine which alternative is the most important for enhancing the viability of online grocery shopping in the Netherlands. Besides, the best alternatives per success and failure factor can also be scored against the stakeholders' objectives on a 5-point Likert Scale. However, a negative impact must be counted as negative, thus the following scores are used for calculations: -2= - - =very negative impact, -1= - = negative impact, 0= +/- = no/barely any impact, 1= + = positive impact and 2= + + = very positive impact. After scoring the alternatives on every objective, these scores are multiplied by the weights of each objective. By summing the scores for every alternative, the weighted sum score (WSC) is calculated that can be compared on which alternative has the highest adoption chance among the other best alternatives. See appendix A for examples.

#### Step 7. Sensitivity analysis and stakeholder implications

In the last step, a sensitivity analysis must be performed and the resulted implications for stakeholders. Since a lot is subjective results were gathered e.g. the weighting of the criteria and the scoring of the alternatives, it is important to do a sensitivity analysis. This might influences the result and leads to implications for the stakeholders. This is done by changing the weights of the objectives or the success

and failure factors. It is proposed to change all the objectives to the same weight in order to assume that all the objectives of different stakeholders are equally important. Given this change, it can be seen whether the best solutions are still preferred that show how robust the solution is.

## **5. Application and lessons learned from a case on online grocery shopping in the Netherlands**

The 'online grocery shopping in the Netherlands' case mainly focused on the last mile delivery of the supply chain (delivery from the warehouses to the customers), since this part of the system has become the biggest challenge for grocery retailers (Punakivi et al., 2001). According to Punakivi et al. (2001), it is very challenging to combine companies' profitability and a high consumer service level. Grocery retailers depend on many stakeholders in the system. These dependencies also impact the efficiency of the last mile delivery of the online ordered groceries e.g. customer's non-attendance due to traffic (congestion) that causes a delay delivery or a delay arrival of the customer (Pan et al., 2007). In addition, the last mile delivery of groceries also includes the traditional societal last mile challenges such as increasing number of vehicle movements, which is associated with more congestion, more noise in the urban areas, more pollution and worse traffic safety level (Quak & Van Duin, 2010). Therefore, the MAMSFFMCA has been applied on this case to enhance the viability of online grocery shopping in the Netherlands.

For eliciting objectives of four key stakeholders, eliciting success and failure factors and to have an initial list of solutions, 16 interviews with stakeholders and experts have been conducted. From these interviews, a total of 61 success factors and 103 failure factors have been gathered. From these, 20 success and failure factors has been selected as the most important ones. Based on these success and failure factors, solutions were elicited based on a selection from the list of initial alternatives, a brainstorm session among experts and a list of self-developed solutions by the researcher. After weighting the objectives and success and failure factors on 5-point Likert Scale stakeholders, these solutions were scored on the weighted success and failure factors. Based on these results, the most potential solutions were selected per crucial success and failure factor by the researcher. These solutions were then evaluated by scoring them on the weighted objectives also on a 5-point Likert Scale by the two stakeholders. This was followed by a sensitivity analysis by giving all the objectives the same weighting 5. These results had led to implications for stakeholders. For every step of the MAMSFFMCA, the lessons learned from this case are elaborated.

### Step 1. Stakeholder identification Step

Lessons learned from the 'online grocery shopping in the Netherlands' case were that the selection of stakeholders that should be involved in the evaluation process missed a guideline that explained why a certain stakeholder should be involved. This leads to certain biases from the researcher that influence the outcomes since the results are evaluated with the stakeholders' objectives.

### Step 2. Stakeholder objectives identification

Lessons learned from the 'online grocery shopping in the Netherlands' case are in line with the previous step. The selection of objectives that should be involved in the evaluation process missed a guideline that explained why a certain objective should be involved. This leads to certain biases from the researcher. This has led to an unbalanced set of objectives that involved 6 objectives of the grocery retailers and only 1 objective of deliverers. The results might not lead to the support of the deliverers for example. Besides, both low costs and profitability were involved in the evaluation process, that have a causal relation. This had led to a double weight for the same objective, even that the objectives have been validated.

### Step 3. Success and Failure Factors (SFF) identification

Lessons learned from the 'online grocery shopping in the Netherlands' case are also related to the missing of criteria for identifying success and failure factors. This would have led to success and failure factors of the same level. In this research, some were at a very strategic level, while others were at an operational level. This was very difficult to compare. Besides, a SFF framework that suits the MAMSFFMCA was missing. The self-developed framework to categorize the factors did not exclude factors to belong to several categories. This might have led to the wrong categorization of factors.

### Step 4. Means exploration and alternatives identification

Lessons learned from the 'online grocery shopping in the Netherlands' case are that for eliciting the solutions, a best method must be chosen. In this research, solutions were elicited from interviews, a brainstorm session and from the expertise of the researcher. This has led to solutions that were not comparable and were thus excluded from the evaluation. Besides, the solutions during the interviews were held in the same session as gathering the data for the objectives, success and failure factors, which has led to solutions that were not designed for a specific success or failure factor. During the interviews, better solutions might thus have been gathered.

### Step 5. Weight the objectives and the SFF's

Lessons learned from the 'online grocery shopping in the Netherlands' case are related to the method for rating the objectives, success and failure factors. For this research, it was chosen to let the interviewees score everything on a 5-point Likert Scale. However, this has been very subjective and led to different results among 2 interviewees, which made both the selection and evaluation procedure of solutions not very objective.

### Step 6. Scoring alternatives against weighted objectives/SFF's

The lessons learned from the 'online grocery shopping in the Netherlands' case is the same as in the previous step. The 5-point Likert Scale has been very subjective and led to different results among 2 interviewees, which made both the selection and evaluation procedure of solutions not very objective. Besides, since not the same alternatives were preferred, this had led to some solutions that were only scored by one stakeholder and another by two stakeholders (average score was taken) that made it not fair to compare the solutions with each other.

### Step 7. Sensitivity analysis and stakeholder implications

The lessons learned from the 'online grocery shopping in the Netherlands' case are related to the sensitivity method and the next steps for stakeholders. Other sensitivity analysis could have been employed that might have been more suitable for practical use than only changing the scores of the weights of the objectives. This might have led to a better evaluation for the robustness of the solutions. Lastly, a feasibility analysis is missing for implementation of the solutions. It is difficult to determine the next steps based on the MAMSFFMCA for the stakeholders.

## **6. Conclusions and Recommendations for Future Research**

The literature review on the SFF frameworks for the adoption of innovations has showed that no framework had been developed that engaged stakeholders for using weighted success and failure factors to propose and evaluate solutions to enhance the viability of innovations. Therefore, MAMSFFMCA is developed that has been a useful tool to engage stakeholders and experts in efficiently identifying success and failure factors of online grocery shopping, to propose alternatives and to

evaluate them. The MAMSFFMCA stands out in three aspects compared to the MAMCA and other MCA methods: 1. it offers structured guidelines for identifying effective solutions that tackle the most important success and failure factors, whereas it remains quite vague how to identify solutions in the MAMCA or other MCA methods 2. it not only evaluates the solutions on objectives as in the MAMCA and MCA, but also on the most crucial success and failure factors for a viable system, and 3. the MAMSFFMCA also allows the stakeholders and experts to have an effective discussion on the best solutions for every success and failure factor, whereas the MAMCA and MCA only allows to compare the solutions based on the scores on the objectives. However, the main limitation of the MAMSFFMCA is that it is more time consuming than the MAMCA and MCA due to the added new steps of identifying, analyzing and evaluating the success and failure factors.

Besides, the MAMSFFMCA also provides a structured method for identifying, analyzing and evaluating success and failure factors. Compared to other SFF frameworks, the MAMSFFMCA 1. not only identifies success and failure factors in a structured way, but also evaluates these factors by assigning weights, and 2. not only analyze success and failure factors, but also propose adequate solutions to cope with these crucial factors. Thus, the MAMSFFMCA has strengthen both the evaluation methods as the SFF frameworks by combining these.

Based on the Dutch online grocery shopping case, it becomes clear that the MAMSFFMCA can also be improved. Firstly, an extensive literature research or the involvement of researchers with the expertise of success and failure factors or evaluation methods should lead to better methods and frameworks for identifying success and failure factors, eliciting solutions, for weighting and scoring the results and for doing a sensitivity analysis. For finding frameworks to identify success and failure factors, also other key words should be used. In order to find better methods for eliciting solutions, more research should be done into design thinking methods. Also, better use of secondary resources and interviews should be made. If an efficient method for selecting a smaller size of success and failure factors, objectives and solutions, a mixed method of MCA techniques such as Analytical Hierarchy Process (AHP) and the Preference Ranking Organisation MeTHod for Enrichment Evaluations (PROMETHEE) can be used for weighting criteria, just as proposed by Macharis et al. (2004) for the MAMCA. A way to enhance the robustness of the solutions is to use scenario analyses for the sensitivity analysis (Hickman, et al., 2012). Secondly, guidelines and rule of thumbs should be provided for every step. This will allow to make better comparisons and selections of the most crucial stakeholders, objectives, success and failure factors, and the best solutions. For this literature studies into every step should be conducted. Thirdly, in order to know what method works best, what guidelines and rule of thumbs are the most applicable and to explore the applicability of the MAMSFFMCA framework, this framework should be applied in other field of researches as well. This will enhance the experience and will lead to incremental improvements of the MAMSFFMCA.

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## Appendix A. Tools for using the MAMSFFMCA

*An example of the questionnaire for eliciting objectives, failure factors, success factors and an initial list of alternatives.*

The key stakeholders were asked to determine their objectives that must be reached with a certain innovation. This is followed by asking what (failure) factors has blocked the stakeholder from achieving the objective and what (success) factor has been underlying the successful achievement of a certain objective. Lastly, the key stakeholder is asked to provide solutions for reaching the objective, given the success and failure factors.

Objective	Failure factors	Success factors	Alternatives
<b>Objective 1</b>	<b>Failure factor 1</b>	<b>Success factor 1</b>	<b>Alternative 1</b>
<b>Objective 2</b>	<b>Failure factor 2</b>	<b>Success factor 2</b>	<b>Alternative 2</b>
<b>Objective 3</b>	<b>Failure factor 3</b>	<b>Success factor 3</b>	<b>Alternative 3</b>
<b>Objective 4</b>	<b>Failure factor 4</b>	<b>Success factor 4</b>	<b>Alternative 4</b>
<b>Objective 5</b>	<b>Failure factor 5</b>	<b>Success factor 5</b>	<b>Alternative 5</b>

*An example of the morphological chart that can be used to elicit alternatives, based on a selected list of most crucial success and failure factors.*

This tool can be used to elicit alternatives during interviews with stakeholders or experts, but also during brainstorm sessions of by the researcher.

Success factors	or	failure	Possible alternatives		
<b>Success factor 1</b>	<b>or</b>	<b>failure</b>	<b>Alternative 1.1</b>	<b>Alternative 1.2</b>	<b>Alternative 1.3</b>
<b>Success factor 2</b>	<b>or</b>	<b>failure</b>	<b>Alternative 2.1</b>	<b>Alternative 2.2</b>	<b>Alternative 2.3</b>
<b>Success factor 3</b>	<b>or</b>	<b>failure</b>	<b>Alternative 3.1</b>	<b>Alternative 3.2</b>	<b>Alternative 3.3</b>
<b>Success factor 4</b>	<b>or</b>	<b>failure</b>	<b>Alternative 4.1</b>	<b>Alternative 4.2</b>	<b>Alternative 4.3</b>
<b>Success factor 5</b>	<b>or</b>	<b>failure</b>	<b>Alternative 5.1</b>	<b>Alternative 5.2</b>	<b>Alternative 5.3</b>

*An example questionnaire to score the importance of an objective or a success or failure factor for the viability of a certain innovation*

For every objective/success and failure factor, the following Likert scale can be used to rate: 1=Unimportant, 2=Slightly important, 3=Moderately important, 4=Important and 5=Very important

Objectives/Success and failure factor	1	2	3	4	5
<b>1. Objectives/Success and failure factor 1</b>					
<b>2. Objectives/Success and failure factor 2</b>					
<b>3. Objectives/Success and failure factor 3</b>					
<b>4. Objectives/Success and failure factor 4</b>					
<b>5. Objectives/Success and failure factor 5</b>					

An example of a questionnaire to score the likelihood that a solution can help to overcome a certain success or failure factor.

For every solution, the following Likert Scale can be used to rate:

1=Definitely not, 2=Probably not, 3=Possibly, 4=Probably and 5=Definitely

Success and failure factor	1	2	3	4	5
1. <b>Solution 1</b>					
2. <b>Solution 2</b>					
3. <b>Solution 3</b>					

An example of a questionnaire to score the impact that a alternative has on the stakeholders' objectives.

For every alternative, the following Likert Scale can be used to rate:

-2= - - =very negative impact, -1= - = negative impact, 0= +/- = no/barely any impact, 1= + = positive impact and 2= + + = very positive impact.

Objectives	Best alternatives				
	1	2	3	4	5
1. <b>Objective 1</b>					
2. <b>Objective 2</b>					
3. <b>Objective 3</b>					
4. <b>Objective 4</b>					
5. <b>Objective 5</b>					

## Appendix B. Stakeholders approaching strategy

The easiest way to approach a stakeholder or expert is if he or she is a direct connection. This is done by sending a personal message via WhatsApp or by mail. Therefore, it is important to find persons who can and is willing to approach stakeholders for you. These persons are from Accenture, TU Delft or others.

- Accenture: the first person to approach is the supervisor from Accenture who know exactly what Accenture experts have expertise in the field of e-commerce, supply chain and retail. The supervisor sent a message via mail to the experts, since they all check their mails daily. The aim of the mail is to:
  - introduce the researcher to the experts
  - explain the aim of the research
  - explain why it is beneficial for Accenture
  - announce that the researcher plans a meeting with them that takes a certain amount of timeAs the latter point already reveals, the following step was to plan a meeting that suits the schedules of the experts. Also, an initial question list has been shared with them, which is discussed in Appendix C.
- TU Delft: the second person to approach is the first supervisor from the TU Delft, since he has guided many students throughout the years that were specialized in logistics and supply chain. Besides, he also knows a lot of independent researches or professors through his career. However, it is not possible for him to approach the stakeholders through any other platform than by LinkedIn. Besides, the contacts were not close contacts. Therefore, the researcher approached these stakeholders by adding them on LinkedIn with the following message:

Beste ....,

mijn naam is Melvin van de TU Delft en ik schrijf mijn scriptie over het efficiënter maken van de bezorgingen van boodschappen nu. Ik kreeg je contact doorgestuurd van mijn begeleider Ron van Duin en ik vroeg me af of ik je misschien kan spreken over dit onderwerp?

mvg,  
Melvin Yip

This message fits the maximum amount of 300 characters that is allowed by LinkedIn if you want to send it to someone who is not connected to you yet. Besides, it describes the aim of the research, the mutual connection and the aim of the message, namely to have a conversation about this subject.

- Others: the same methods have been applied for the other second-degree connections of the researcher. These second-degree connections were found by several methods:
  - Entering the name of a certain grocery retailer and with or without the function of the person, on LinkedIn. Then find common connections and send a message to the common connection for more information about the potential interviewee. Then let this common connection introduce the researcher to the potential interviewee and provide a phone number or mail.

- Having informal conversations with everyone about this topic and ask for connections that are one of the identified key stakeholders. Then also ask them to introduce the researcher to the potential interviewee and provide a phone number or mail.
- Going to events related to the subject of this thesis such as the Central Innovation District – Smart Logistics talk. Here, the researcher met someone from a delivery company who also gave his mail in order to connect the researcher with someone who is expert in the field of grocery delivery and provide a phone number or mail.

For this initial search, an overview of the approached parties has been given in table 26. Before the interview, it is not known whether the experts or independent researchers are also customers of the online grocery services. Therefore, this is undecided in the overview. Due to anonymization, no personal names or company names are given.

**Table 26.** Overview of approached stakeholders and experts during initial search

	Type of stakeholder	Function	Connection from	Media
1.	AE/CPAE	Manager Director Retail consulting and customer experience	Accenture	Mail
2.	AE/CPAE	Senior manager mobility	Accenture	Mail
3.	AE/CPAE	Supply chain & Operations strategy manager	Accenture	Mail
4.	AE/CPAE	Strategy consultant	Accenture	Mail
5.	AE/CPAE	Director omni-channel/e-commerce	Accenture	Mail
6.	AE/CPAE	Senior manager mobility retail and consumer goods	Accenture	Mail
7.	AE/CPAE	Business strategy consultant	Accenture	Mail
8.	GR	Former Growth Analyst	Other	WhatsApp
9.	GR	Former Fulfillment Analyst	TU Delft	LinkedIn
10.	GR	Growth Analyst	TU Delft	LinkedIn
11.	GR	Strategy Director	TU Delft	LinkedIn
12.	GR	Owner Store	Other	WhatsApp
13.	GR	Management trainee	Other	LinkedIn
14.	GR	Supply chain Analyst	Other	WhatsApp
15.	GR	Supply chain improvement manager online	TU Delft	LinkedIn
16.	DC	General Manager City Logistics	Other	Mail
17.	DC	Head of Product & Innovation	TU Delft	LinkedIn
18.	OE	Deliverer	Other	WhatsApp
19.	IR/CPiR	Assistant Professor Sustainable Logistics	TU Delft	LinkedIn
20.	IR/CPiR	Advisor Innovation mobility	TU Delft	LinkedIn
21.	IR/CPiR	Lecturer Cities and Logistics	TU Delft	LinkedIn
22.	IR/CPiR	Smart cities and Logistics	TU Delft	LinkedIn
23.	IR/CPiR	Innovation manager Resource use efficiency	TU Delft	LinkedIn
24.	CS	Policy developer of Urban planning	TU Delft	LinkedIn
25.	CS	Former advisor Sustainable mobility	TU Delft	LinkedIn
26.	CS	Project manager Smart mobility	Other	LinkedIn
27.	CS	Policy civil servant	Other	Mail

Some stakeholders in table 26 can be very helpful. A strategy is to ask the person whether they know people who belong to a certain stakeholder group. This is either done via mail or during the interview. Some examples are given:

- Redirect: if the approached person knows that he or she is not an expert in the last mile delivery of online groceries, then it happens that other persons will be connected to the researcher.
- Interest: due to kindness and the small effort it takes; the person can also share other connections because he or she has an interest in the thesis.
- Interview: the researcher asks during the interview if the stakeholder knows other stakeholders.

Some asked for a template with information about the research and the interview that is conducted to send to these third-degree connections. This template must involve the following elements according to Accenture experts:

- Introduction of researcher
- Aim of research with research question
- Method
- Reason why the researcher wants to approach the stakeholder
- The real question for the stakeholder to ask permission

These elements were incorporated in the template. The following template has been used:

Mijn naam is Melvin Yip en ik ben momenteel aan het afstuderen voor mijn Master programma Complex Systems Engineering and Management aan de TU Delft. Hiervoor schrijf ik mijn thesis over hoe ik het last mile bezorgen van boodschappen kan verbeteren door middel van het analyseren van de barrières en de kansen die er op dit moment zijn. Mijn onderzoeksvraag is dan ook (in het Engels):

“How can the last mile delivery system of online groceries in the Netherlands be enhanced by incorporating weighted success and failure factors of last mile delivery solutions?”

Om goed de barrières an kansen in deze markt te analyseren en om draagvlak te creëren voor de oplossingen, wil ik de stakeholders van het last mile bezorgen van boodschappen betrekken. Daarom zou ik u dan ook graag willen interviewen, zodat uw doelen, belangen en inzichten op de barrières en kansen ook goed vertegenwoordigd worden in dit process.

Zou ik daarom 60 minuten van uw kostbare tijd mogen reserveren voor een interview? Ik hoor graag van u of dit mogelijk is en wanneer het eventueel voor u zal uitkomen.

The connections approached via these strategies are given in table 27.

**Table 27.** Overview of approached stakeholders and experts via leads from initial search

	Type of stakeholder	Function	Connection from	Strategy	Media
1.	AE/CPAE	Principal Director at Accenture Strategy (SC focus)	AE/CPAE	Interest	Mail
2.	AE/CPAE	Senior Manager Supply Chain & Operations	AE/CPAE	Redirect	Mail
3.	AE/CPAE	Transport Lead	AE/CPAE	Interest	Mail
4.	AE/CPAE	Business Development	AE/CPAE	Interest	Mail
5.	AE/CPAE	Founder	IR	Interview	Mail
6.	AE/CPAE	Director Logistics	IR	Interview	Mail
7.	GR	Manager Online Operations	IR	Interview	LinkedIn
8.	GR	Manager E-Commerce	AE/CPAE	Interview	Mail
9.	GR	Supply Chain Developer	AE/CPAE	Interview	Mail
10.	GR	Manager E-Commerce Operations	AE/CPAE	Interview	Mail
11.	CS	Coordinator Freight Transport and Logistics	CS	Redirect	Mail
12.	CS	Project manager Logistics & Smart mobility	CS	Redirect	Mail
13.	DC	Product Owner Food	DC	Redirect	WhatsApp
14.	OE	Human Resource Agent	OE	Interest	WhatsApp
*15.	OE	Team Lead Delivery	OE	Interest	WhatsApp

\* stakeholder number 15 was invited by stakeholder number 14 to join the interview because of interest.

Given the fact that 27+15=42 stakeholders and experts were approached, not everyone was interviewed. This was either due to ignorance, confidential information or because of a lack of expertise in the topic. However, still 16 stakeholders or experts were willing to provide information. Table 28 provides an overview of the stakeholders with their functions and the date of interview.

**Table 28.** Overview of interviewed stakeholders with their functions and meeting dates

	<b>Type of stakeholder</b>	<b>Function</b>	<b>Date of interview</b>
1.	CPAE	Principal director at Accenture strategy (SC focus)	29-10-2019
2.	CPAE	Senior manager mobility	30-10-2019
3.	OE	Deliverer	31-10-2019
4.	CPIR	Lector cities and logistics	4-11-2019
5.	GR	Strategy Director	5-11-2019
6.	CPAE	Manger Director Retail consulting and customer experience	8-11-2019
7.	CPAE	Supply chain & Operations strategy manager	8-11-2019
8.	GR	Growth Analyst	8-11-2019
9.	CS	Projectmanager Logistics & Smart mobility	12-11-2019
10.	GR	Supply chain analyst	13-11-2019
11.	CPAE	Business strategy consultant	15-11-2019
12.	GR	Manager online operations	18-11-2019
13.	OE	Human Resource Agent	18-11-2019
14.	OE	Teamlead delivery	18-11-2019
15.	DC	Product Owner Food	20-11-2019
16.	IR	Assistant professor sustainable logistics	28-11-2019

## Appendix C. Interview strategy and content

For eliciting the objectives and the corresponding success and failure factors, a semi-structured interview is used. This method allows the researcher to stir the conversation to an angle that is important for the research (Brinkmann, 2014). For this, a strategy must be set up. Besides, as experiences in the previous step, it takes a lot of effort to identify stakeholders and to plan meetings with them. Therefore, the knowledge gathered for every interview is very valuable. This means that priorities must be set, and expectations of the stakeholders must be in line with the interview. At the beginning of every interview, the answer sheet used for every interview are shown to the interviewees in order to let them know how the interview are structured and what data the researcher wants to elicit from the interview. This is shown in table 29. All the results of the interviews in appendix D are also in the same form. Given this answer sheet, the following questions are asked:

1. Watvoor doelen moeten er worden nagestreefd voor een succesvol last mile bezorging?
2. Waardoor lukt het niet om een bepaald doel te halen? Wat zijn dus de faalfactoren?
3. Welk doel is al wel redelijk goed gehaald en hoe is dat gelukt? Wat zijn dus de succesfactoren?
4. Gegeven deze factoren, wat zouden ideeën kunnen zijn om elk doel na te streven?

(Welke stakeholders zijn er betrokken bij de last mile bezorging van online bestelde boodschappen? En heeft u toevallig contacten voor mij?)

**Table 29.** Answer sheet template for semi-structured interview

Doel	Faalfactoren	Succesfactoren	Alternatieven

The questions are ranked based on the priorities. The aim of this interview is to gather clear objectives from every stakeholder group and the corresponding success and failure factors. Thus, the possible alternatives are not that important, since this is gathered during the next activities. If an objective is broad or vague, the researcher asks the interviewee what the objective means for the person in order to have a better interpretation of the objective. This usually gives more insights about how the interviewee experience the last mile delivery system of online groceries. Besides, abstract terminologies are explained or avoided during the interview e.g. not asking “what are the failure factors of this objective?”, but rather ask “why are certain objective not achieved yet? So, what factors caused this failure?” This is in line with what good interview questions are according to Brinkmann (2014):” good interview questions invite interviewees to give descriptions and good interviewers tent to avoid more abstract and reflective questions.”

Besides, success and failure factors are not two different kind of factors, since they both influence the adoption of an innovation in the same way. For example, Stockon was pulled back the market because no investors could be found, in which the lack of investors can be determined as a failure factor (Ecommerce News, 2019a). However, Picnic could have invested a lot more and continue their businesses because they received 250 million euros in investments, in which the availability of funds can be determined as a success factor (Pijpker, 2019). Therefore, if a company only has success factors or only failure factors for a certain objective, then the interview can continue. Lastly, if the conversation allows, the first several interviews are also used to find more stakeholders. Therefore, the last question is asked in a subtle way if the conversation goes to anything near the subjects of stakeholders.

In order to not miss any important details, the interviews are recorded. This allows the researcher to listen to every detail after the interview. For this, permission is asked just before the interview is about to start. Besides, some interviews were also held via skype or through the phone if a stakeholder was too busy to meet or if he or she lives too far away. The next section provides the results. In order to validate the gathered data, the interview results per interviewee are sent back via mail.

## Appendix D. Semi-structured interviews with stakeholders: Eliciting objectives, success and failure factors and an initial list of alternatives

Every semi-structured interview that has been performed during the period of 29-10-2019 and 28-11-2019 will have the following way of documentation:

### Stakeholder information:

- Interviewee belongs to stakeholder group X
- Function interviewee
- Interview date

### Objectives:

<b>(Optional)</b>		<b>Doel</b>	<b>Extra toelichting</b>
Point of view 1	1.		
	2.		
Point of view n	3.		
	4.		
	n		

### Success and failure factors:

	<b>Doel</b>	<b>Succesfactor</b>	<b>Faalfactor</b>
1.		1.	
		2.	
		3.	
2.			1.
			2.
			3.
n		1.	1.
		2.	
		3.	

### Initial list of alternatives (if applicable):

	<b>Doel</b>	<b>Alternatieven</b>
1.		
2.		
3.		
4.		
n		

## Accenture experts with customer experience objectives

### Interview 1

#### Stakeholder information:

- Stakeholder group: Customer perspectives represented by Accenture experts
- Function: Principal director at Accenture strategy (Supply chain focus)
- Date of interview: 29-10-2019

#### Objectives:

		<b>Doel</b>	<b>Extra toelichting</b>
Consument	1.	Maximale flexibiliteit	1. Zelf bezorgtijden bepalen en wijzigen en opties voor retourneren
	2.	Gemak consument	1. De customer journey bij bestellen website/apps vergemakkelijken door aanbevelingen te doen 2. Makkelijk betalen 3. Levering tot aan keuken
	3.	Lage kosten consument	
	4.	Hoog schrapsbeschikbaarheid	
	5.	Laag aantal niet bezorgde producten	
Retailer	6.	Veel omzet	
	7.	Lage kosten retailer	
Overheid	8.	Milieuvriendelijk	1. Lage CO <sub>2</sub> uitstoot
	9.	Laag aantal busjes	
Bezorger	10.	Gemak bezorger	1. Efficiente bezorging

Success and failure factors:

		Doel	Succesfactor	Faalfactoren
Consument	1.	Maximale flexibiliteit	1. Veel bezorgopties	1. Te hoge kosten 2. Lage beschikbaarheid werknemers
	2.	Gemak consument	1. Veel opties aanbieden	1. Prioriteit budget en focus niet op website 2. Technische complexiteit om website en app te maken, bv het aangeven van real time voorraden op website
	3.	Lage kosten		1. Hoge kosten bezorging
	4.	Hoog schrapsbeschikbaarheid		1. Verkeerde voorspelling 2. Leverancier niet genoeg geleverd 3. Te weinig schrapruimte
	5.	Laag aantal niet bezorgde producten		1. Menselijke fout bij pakkers 2. Te laat geleverd leverancier 3. Te weinig besteld
Retailer	6.	Veel omzet	1. First mover advantage	1. Weinig volume door beperkte aankoopgedrag 2. Mensen nog huiverig om online te bestellen 3. Mensen houden niet van vantevoren plannen.
	7.	Lage kosten	1. Veel tijd tussen bestelling en bezorging	1. Relatief kleine bestellingen 2. Veel kosten voor bezorgservice (kosten distributiecentrum, variable kosten, bezorgkosten, chauffeur, brandstofkosten)
Overheid	8.	Milieuvriendelijk	1. Elektrische busjes	
	9.	Laag aantal busjes		1. Inefficiënt om busjes te combineren vanwege extra handeling
Bezorger	10.	Gemak bezorger		

## Interview 2

### Stakeholder information:

- Stakeholder group: Customer perspectives represented by Accenture experts
- Function: Senior manager mobility
- Date of interview: 30-10-2019

### Objectives:

	Doel	Extra toelichting
1.	Lage impact leefomgeving	1. Lage files en 2. Minimale (geluids)overlast
2.	Lage kosten	
3.	Snelle bezorging	
4.	Milieuvriendelijk	
5.	Flexibiliteit voor zowel klanten als retailer	

### Success and failure factors:

	Doel	Succesfactor	Faalfactor
1.	Lage impact leefomgeving		<ol style="list-style-type: none"> <li>1. Technisch complexiteit: lage capaciteit huidige alternatieven zoals fiets met even veel kosten bezorger</li> <li>2. Geografisch reden: Afstand tussen hub en klant</li> <li>3. Hoge investerings kosten.</li> <li>4. Bestaande wagens betekent niet nieuwe gebruiken</li> <li>5. Krap arbeidsmarkt, want je kan geen carrière opbouwen</li> </ol>
2.	Lage kosten		<ol style="list-style-type: none"> <li>1. Consument veelesierend(cheap, fast and good) verwend geraakt. Door amazon hun model die alles gratis, snel en ongelimiteerd kan omruilen.</li> <li>2. Schaalvoordelen niet optimaal benut door kosten in andere aspecten e.g. hoofdkantoor, overhead, marketing personeel, HR, vakkenvullers, cassieres, door winkel.</li> </ol>
3.	Snelle bezorging		<ol style="list-style-type: none"> <li>1. Dynamische planning ontbreekt: wagens continu in beweging. Technologie ontbreekt.</li> <li>2. Schaal mist.</li> <li>3. Gedrag van mensen moeilijk te voorspellen</li> </ol>
4.	Milieuvriendelijk		<ol style="list-style-type: none"> <li>1. Bestaande vloot.</li> <li>2. Schaal mist, dus is nog niet te doen.</li> <li>3. Geen laadinfrastructuur nog betekent veel investeringskosten</li> </ol>
5.	Flexibiliteit voor zowel klanten als retailer		<ol style="list-style-type: none"> <li>1. Techniek</li> <li>2. Traditionele manier van supply chain denken</li> </ol>

			3. Gedrag klanten
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Initial list of alternatives:

	<b>Doel</b>	<b>Alternatieven</b>
1.	Lage impact leefomgeving	Fiets met groter capaciteit
2.	Lage kosten	DC and hubs dichterbij klant
3.	Snelle bezorging	Dynamisch model zoals een Uber-systeem. Hiervoor kan een pilot voor gestart worden.
4.	Milieuvriendelijk	Milieuvriendelijk zijn op andere manieren dan alleen elektrisch rijden
5	Flexibiliteit voor zowel klanten als retailer	Blank sheet beginnen. Vragen aan klant waar en wanneer ze bezorgt willen hebben. Bv. GPS systeem gebruiken.

### Interview 3

#### Stakeholder information:

- Stakeholder group: Customer perspectives represented by Accenture experts
- Function: Supply chain & Operations strategy manager
- Date of interview: 08-11-2019

#### Objectives:

		<b>Doel</b>	<b>Extra toelichting</b>
Consument			1. Voorzien behoefte van de klant 2. Juiste spullen op juiste moment hebben
	1.	Gemak consument	3. Goed assortiment aanbod
	2.	Lage kosten consument	1. Lage bezorgkosten 2. Lage bezorgbundelkosten
	3.	Hoog schrapsbeschikbaarheid	
Retailer		Marktaandeel behouden en meer winst maken	1. Hoe rendabel boodschappen thuisbrengen 2. Vasthouden business
	5.	Lage kosten retailer	1. Veel stops in kleine afstand

Success and failure factors:

		<b>Doel</b>	<b>Succesfactor</b>	<b>Faalfactoren</b>
Consument	1.	Gemak consument		<ol style="list-style-type: none"> <li>1. Technologie: consument kunnen helpen met lijstje klaarzetten</li> <li>2. Meer ritten voor beter aansluiting wensen klanten voor meer flexibelere bezorgingen</li> </ol>
	2.	Lage kosten consument		<ol style="list-style-type: none"> <li>1. Consument gewend aan bepaalde prijs, dus wordt door markt bepaald</li> </ol>
	3.	Hoog schrapbesikbaarheid		<ol style="list-style-type: none"> <li>1. Geen goede voorspelling waardoor voorraad niet op orde is</li> <li>2. Geen goede reactietijd aanvullen.</li> <li>3. Lage houdbaarheid producten niet goed ingeschat</li> <li>4. Interne strijd tussen offline en online winkels wat betreft het verdelen van voorraden</li> </ol>
Retailer	4.	Marktaandeel behouden en meer winst maken		<ol style="list-style-type: none"> <li>1. Weinig gebruik van recepten</li> <li>2. Concurrentie pakt groot gedeelte home delivery</li> <li>3. Nog niet voldoen aan voorraadbeschikbaarheid eisen consument</li> <li>4. Hoge bezorgkosten voor consument maakt het onaantrekkelijk</li> </ol>
	5.	Lage kosten retailer		<ol style="list-style-type: none"> <li>1. Vast kosten door interne inkoopprijs</li> </ol>

Initial list of alternatives:

		<b>Doel</b>	<b>Alternatieven</b>
Consument	1.	Gemak consument	1. Overstapdiensten voor wennen aan andere producten en merken 2. Meer schaal krijgen voor andere producten
	2.	Lage kosten consument	
	3.	Hoog schrapbesikbaarheid	1. Voorraadrisico bij leverancier leggen via deals zodat product toch aangeboden kan worden
Retailer	4.	Marktaandeel behouden en meer winst maken	1. Beter kosten onder controle krijgen door verkrijgen meer data ritten. 2. Beter ritplanning. 3. Andere distributie modellen bv. niet uit winkels kijken 4. Lokale afhaalpunten bij burens door misschien een grote vrieerkast te installeren
	5.	Lage kosten retailer	1. Meer data verkrijgen over bezorghuizen zoals informatie over hoogbouw en laagbouw voor ritplanning optimalisatie 2. Straten toegankelijker maken

## Interview 4

### Stakeholder information:

- Stakeholder group: Customer perspectives represented by Accenture experts
- Function: Manager director retail consulting and customer experience
- Date of interview: 08-11-2019

### Objectives:

		Doel	Extra toelichting
Consument	1.	Brengen op moment dat klant wil	
	2.	Lage kosten consument	
	3.	Meerwaarde van bezorgen	
Retailer	4.	Meer verkopen	
	5.	Lage kosten retailer	

### Success and failure factors:

		Doel	Succesfactor	Faalfactoren
Consument	1.	Brengen op moment dat klant wil		1. Communicatiemiddel ontbreekt om precies te weten wanneer klant dat wil
	2.	Lage kosten consument		1. Wat mensen gewend zijn
	3.	Meerwaarde van bezorgen		1. Winkelervaring komt niet terug door gebrek aan onderscheidend vermogen 2. Veel kosten 3. Duurt langer
Retailer	4.	Meer verkopen	1. Flexiblere tijdsslots	1. Meer focus op efficiëntie in plaats randzaken 2. Beter vaak bestelde producten aanbevelen 3. Vertrouwen in een merk
	5.	Lage kosten retailer		1. Te laat plannen en vullen wagen zorgt voor ineffiënties en gebrek aan snelheid 2. Dichtheid is een probleem 3. Vrijheid klanten niet per se nodig 4. Bezorgauto's niet optimaal ingericht



Initial list of alternatives:

		<b>Doel</b>	<b>Alternatieven</b>
Consument	1.	Brengen op moment dat klant wil	<ol style="list-style-type: none"> <li>1. Klanten nudgen</li> <li>2. Klanten claimen van tevoren een tijdslot</li> </ol>
	2.	Lage kosten consument	<ol style="list-style-type: none"> <li>1. Een partij die voor alle supermarkten bezorgt</li> </ol>
	3.	Meerwaarde van bezorgen	<ol style="list-style-type: none"> <li>1. Producten meenemen die mensen misschien toch nog erbij zouden willen kopen bv. voor substitutie als producten niet leverbaar zijn</li> </ol>
Retailer	4.	Meer verkopen	<ol style="list-style-type: none"> <li>1. Bepaalde producten uit winkel halen</li> <li>2. In hubs ook producten hebben</li> <li>3. Lijst met aanbevolen producten</li> </ol>
	5.	Lage kosten retailer	

## Interview 5

### Stakeholder information:

- Stakeholder group: Customer perspectives represented by Accenture experts
- Function: Business strategy consultant
- Date of interview: 15-11-2019

### Stakeholder information:

- Stakeholder group: Customer perspectives represented by Accenture experts
- Function: Supply chain & Operations strategy manager
- Date of interview: 08-11-2019

### Objectives:

		<b>Doel</b>	<b>Extra toelichting</b>
Consument	1.	Gemak consument	1. Niet meer naar winkel hoeven met kinderen bespaart moeite
	2.	Tijdswinst	2. Vanuit thuis bezorgen 3. Hele lijst kunnen opslaan met boodschappen
Retailer	3.	Marktaandeel behouden en meer winst maken	1. Fear of missing out 2. Klanten voldoen aan hun online behoefte 3. Geen marktaandeel verliezen doordat mensen gebruik maken van online diensten andere supermarkten
	4.	Lage voorraadkosten	
	5.	Lage working capital	
	6.	Meer cross sellings	1. E.g. Picnic bezorgt producten van Nespresso
	7.	Meer klanten	
	8.	Laag aantal bezorgdiensten voor verschillende afdelingen	
	9.	Goed return policy	
	10.	Goed imago	1. Zichtbaarheid in straten
	11.	Breed assortiment onder aandacht brengen	
	12.	Lage CO <sub>2</sub> uitstoot	

Success and failure factors:

		<b>Doel</b>	<b>Succesfactor</b>	<b>Faalfactoren</b>
Consument	1.	Gemak consument		<ol style="list-style-type: none"> <li>1. Beter bezorgtijden voor de consument door beter te voorspellen wat gunstig is voor consument</li> <li>2. Kleinere tijdslots om flexibiliteit te verhogen</li> <li>3. Mogelijkheid hebben om producten last moment nog toe te voegen</li> <li>4. Mist het gevoel dat je producten kan voelen</li> <li>5. Houdbaarheid dat soms te kort</li> <li>6. Lagere minimum prijs</li> </ol>
	2.	Tijdswinst	1. Picnic nooit tot bespaart tijd	
Retailer	3.	Marktaandeel behouden en meer winst maken	<ol style="list-style-type: none"> <li>1. First mover advantage</li> <li>2. Grote klanten basis al hebben</li> </ol>	
	4.	Lage voorraadkosten	<ol style="list-style-type: none"> <li>1. Al algoritmes gebruiken om goed te voorspellen wat er besteld wordt en waarom</li> <li>2. In nacht afspraak maken met aanbieders die in de nacht producten aanleveren betekent geen voorraas</li> <li>3. Handling system efficiënt maken</li> </ol>	
	5.	Lage working capital	1. Lagere voorraad betekent minder werknemers ervoor	

6.	Meer cross sellings	<ul style="list-style-type: none"> <li>1. Imago past bij elkaar</li> <li>2. Goed klanten ervaring</li> </ul>	
7.	Meer klanten		
8.	Laag aantal bezorgdiensten voor verschillende afdelingen		<ul style="list-style-type: none"> <li>1. Betere communicatie en governance tussen afdelingen</li> </ul>
9.	Goed return policy		<ul style="list-style-type: none"> <li>1. Gebrek aan focus op het maken van een goed return policy</li> <li>2. Urgentie creëren door het winstgevend te maken</li> </ul>
10.	Goed imago	<ul style="list-style-type: none"> <li>1. Reclame via busjes die midden in de straten te zien zijn</li> </ul>	
11.	Breed assortiment onder aandacht brengen	<ul style="list-style-type: none"> <li>1. Promotieproducten van AH</li> </ul>	
12.	Lage CO <sub>2</sub> uitstoot	<ul style="list-style-type: none"> <li>1. Goed CO<sub>2</sub> beleid vanaf begin</li> </ul>	<ul style="list-style-type: none"> <li>1. Hoge range van AH busjes zorgen voor meer meenemen, maar ook meer uitstoot.</li> </ul>

Initial list of alternatives:

	Doel	Alternatieven
Consument	1. Gemak consument	<ol style="list-style-type: none"> <li>1. Later wijzigen bestellingen en tijd=flexibelere supply chain</li> <li>2. VR of AR waardoor je door een winkel kan lopen en inspiratie op kan doen</li> <li>3. Accurater afstemming van aantal personen per recept met de producten die je in je mand krijgt</li> <li>4. Andere e-commerce diensten zoals Bol.com producten samen met boodschappen</li> <li>5. Verpakkingsloze producten e.g. pasta met een wekpot</li> </ol>
	2. Tijdswinst	<ol style="list-style-type: none"> <li>1. Meer aanbevelingen met wat je wil bestellen</li> <li>2. Tijd verkorten van bestellen of voor de deur staan</li> </ol>
Retailer	3. Marktaandeel behouden en meer winst maken	<ol style="list-style-type: none"> <li>1. Meer toegevoegde waarde voor klanten door ze bv vers producten te laten kiezen</li> </ol>
	4. Lage voorraadkosten	
	5. Lage working capital	
	6. Meer cross sellings	<ol style="list-style-type: none"> <li>1. Producten die vaak samen worden besteld als duo aanbevelen met kortingen</li> <li>2. Voordeel voor beide partijen creëren</li> </ol>
	7. Meer klanten	<ol style="list-style-type: none"> <li>1. Bepaalde producten alleen online aanbieden of kortingen geven</li> <li>2. Same day delivery voor mensen die niet weten wat ze willen eten</li> <li>3. Bij bedrijven of bij plekken waar mensen vaak samenkomen same day delivery aanbieden</li> </ol>
	8. Laag aantal bezorgdiensten voor verschillende afdelingen	<ol style="list-style-type: none"> <li>1. Inkooporganisatie verbeteren</li> <li>2. Bezorgprocessen lijnen</li> </ol>
	9. Goed return policy	<ol style="list-style-type: none"> <li>1. Baterijen meegeven.</li> <li>2. Kleren meegeven aan goed doel=do good platform</li> <li>3. Oud plastic meegeven</li> </ol>
	10. Goed imago	<ol style="list-style-type: none"> <li>1. Beeldscherm op straat met inspiratie van gerechten</li> </ol>
	11. Breed assortiment onder aandacht brengen	<ol style="list-style-type: none"> <li>1. Gratis bijzondere producten aanbieden</li> <li>2. AH mand meenemen met deze producten en vragen aan klant of die het product wil</li> <li>3. Consument is heel prijsbewust, dus wellicht voor zelfde prijs als substitutieartikelen aanbieden</li> <li>4. VR of AR experience</li> </ol>
	12. Lage CO <sub>2</sub> uitstoot	<ol style="list-style-type: none"> <li>1. Meer elektrische voertuigen</li> <li>2. Bundelen bezorgdiensten</li> </ol>

## Operational employees

### Interview 6

#### Stakeholder information:

- Stakeholder group: Operational employees
- Function: deliverer
- Date of interview: 31-10-2019

#### Objectives:

		<b>Doel</b>	<b>Extra toelichting</b>
	1.	Veel salaris	
	2.	Op tijd bezorgen	
	3.	Betrouwbare werktijden	
	4.	Flexibiliteit	
	5.	Comfort voor bezorgers	1. Comfortabele werkkleding 2. Eten meekrijgen 3. Niet problemen van andere bezorgers oplossen
	6.	Goed imago	
	7.	Klantvriendelijkheid	

Success and failure factors:

	Doel	Succesfactor	Faalfactoren
1.	Veel salaris	1. Door veel verantwoordelijkheid voor bezorgers	
2.	Op tijd bezorgen	1. Prestatiecijfers bespreken	1. Ervaring mist, waardoor processen minder efficient lopen
3.	Betrouwbare werktijden	1. Carrière gesprekken met teamleiders	1. Miscommunicatie tussen planners en bezorger, waardoor bepaalde taken gedaan moeten worden die niet afgesproken zijn.
4.	Flexibiliteit	1. Door urgentie moeten ze het aantrekkelijk maken 2. Goede resultaten in het verleden leiden tot meer flexibiliteit	
5.	Comfort voor bezorgers	1. Zware ritten worden vermeden voor voorladers	1. Soms geen schone busjes door gedrag andere bezorgers
6.	Goed imago	1. Elektrische wagens zorgen voor goed imago	1. Geen mooie kleding voor bezorgers 2. Mensen hinderen
7.	Klantvriendelijkheid		

Initial list of alternatives:

	Doel	Alternatieven
1.	Veel salaris	
2.	Op tijd bezorgen	
3.	Betrouwbare werktijden	1. Zorgen voor goede en betrouwbare communicatiemiddelen bv. goed werkend planner
4.	Flexibiliteit	1. Na een rit vragen wat er beter kan bv. dat busje niet schoon was en dat de persoon ervoor erop wordt aangesproken
5.	Comfort voor bezorgers	1. Mooiere outfits 2. Meer focussen op aannemen vrouwen 3. Ritten minder zwaar maken
6.	Goed imago	4.
7.	Klantvriendelijkheid	1. Ratingsysteem

## Interview 7

### Stakeholder information:

- Stakeholder group: Operational employees
- Function: Human Resource Agent
- Date of interview: 18-11-2019

### Objectives:

		Doel	Extra toelichting
	1.	Goede representativiteit werknemers	
	2.	Gemotiveerde werknemers	
	3.	Veiligheid	
	4.	Fijne werkgever	
	5.	betrokkenheid	

### Success and failure factors:

		Doel	Succesfactor	Faalfactoren
	1.	Goede representativiteit werknemers		1. Houding bezorger is soms slecht als ze de weg blokkeren 2. Tijdsdruk voor bezorgers
	2.	Gemotiveerde werknemers		1. Geen urengarantie
	3.	Veiligheid	1. Samevoegen AH online met AH zorgde voor meer investering in technische middelen	
	4.	Fijne werkgever		1. Geen goed faciliteiten e.g. verwarming voor bezorgers
	5.	betrokkenheid	1. Constante gesprekken voeren	

Initial list of alternatives:

		<b>Doel</b>	<b>Alternatieven</b>
	1.	Goede representativiteit werknemers	1. Bakfiets zorgt voor minder overlast
	2.	Gemotiveerde werknemers	
	3.	Veiligheid	<ol style="list-style-type: none"> <li>1. Meer training om ervaringen uit te wisselen.</li> <li>2. Vooral ook training op achteruit rijden, want dat zorgt voor 70% van de schade ongeveer.</li> <li>3. Ook training na 10 weken, omdat mensen dan minder alert zijn en er dus meer schade is.</li> <li>4. Schadedetentie klas als je schade hebt gereden.</li> <li>5. Rij simulatie</li> <li>6. Opleiders goed trainen</li> </ol>
	4.	Fijne werkgever	
	5.	betrokkenheid	

## Interview 8

### Stakeholder information:

- Stakeholder group: Operational employees
- Function: team leader delivery
- Date of interview: 18-11-2019

### Objectives:

		<b>Doel</b>	<b>Extra toelichting</b>
	1.	Lage schadekosten	
	2.	Complete orders	
	3.	Tijdigheid	1. Vertrektijdigheid 2. Tijdig bij klant
	4.	Lage personeelskosten	
	5.	Houden aan alcoholbeleid	
	6.	Lange verblijfsduur werknemers	

Success and failure factors:

		Doel	Succesfactor	Faalfactoren
	1.	Lage schadepkosten		
	2.	Complete orders		
	3.	Tijdigheid	1. Tijden gemeten en besproken met bezorgers	1. Planning in verschillende gebieden gaan op zelfde manier terwijl op sommige plaatsen er meer file voorkomt, meer stoplichten zijn, vollere ritten zijn en meer wegopbrekingen
	4.	Lage personeelskosten		
	5.	Houden aan alcoholbeleid		
	6.	Lange verblijfsduur werknemers	1. Mensen die werken in de hubs zoals opleiders en plussers blijven wel lang door betrouwbare uren	1. Ergens anders urengarantie 2. Wisselende uren onaantrekkelijk voor mensen met een gezin 3. Voor studenten is bezorgen een bijbaan

Initial list of alternatives:

		Doel	Alternatieven
	1.	Lage schadepkosten	
	2.	Complete orders	1. Meer gebruik maken voorraad van winkels
	3.	Tijdigheid	1. Makkelijker maken voor bezorgers door bv. Automatische incasso 2. Sneller verzamelen van boodschappen
	4.	Lage personeelskosten	
	5.	Houden aan alcoholbeleid	
	6.	Lange verblijfsduur werknemers	1. Altijd zelfde ritten aanbieden met constantere uren 2. Werven mensen met affiniteit voor logistiek

## Customer perspectives represented by independent researcher

### Interview 9

#### Stakeholder information:

- Stakeholder group: Customer perspectives represented by independent researcher
- Function: Lector cities and logistics
- Date of interview: 4-11-2019

#### Objectives:

		<b>Doel</b>	<b>Extra toelichting</b>
	1.	Gemak	1. Assortiment die bij klanten past 2. Boodschappen moeten er zijn wanneer het de klant uitkomt 3. Prijs moet goed zijn 4. Verse producten 5. Compleetheid bezorging producten 6. Bezorging tot aan keuken 7. Retour van producten moet goed verlopen 8. Goede schatting van aankomsttijd
	2.	Winst	
	3.	Groot marktaandeel	
	4.	Winkel voortbestaan	
	5.	Duurzaam	1. CO <sub>2</sub> uitstoot verlagen
	6.	Goede arbeidsvoorwaarde	
	7.	Veilige stad	1. Schade aan stad bv. paal meepakken en viaduct beschadigen
	8.	Mindere kosten	
	9.	Waardering van bedrijf	
	10.	Lage overlast straat/buren	
	11.	Imago	1. Imago van winkel uitdrukken

Success and failure factors:

	Doel	Succesfactor	Faalfactoren
1.	Gemak		<ol style="list-style-type: none"> <li>1. Low assortment due to lack of inventory and warehouse space</li> <li>2. Shortage of employees</li> </ol>
2.	Winst	<ol style="list-style-type: none"> <li>1. Picnic geen fysieke winkel en dus geen kosten ervan</li> </ol>	<ol style="list-style-type: none"> <li>1. Transportkosten</li> <li>2. Derving van producten</li> <li>3. Consumenten doen eigen boodschappen in winkels</li> <li>4. Onbetrouwbare klanten bij vooral AH</li> <li>5. Geen patronen kunnen herkennen in data</li> </ol>
3.	Groot marktaandeel	<ol style="list-style-type: none"> <li>1. korting geven op basis van volume</li> </ol>	<ol style="list-style-type: none"> <li>1. Picnic bezorgt alleen in drukke gebieden</li> </ol>
4.	Winkel voortbestaan	<ol style="list-style-type: none"> <li>1. Versere producten</li> <li>2. Producten die online missen</li> <li>3. Cruciale producten zoals luiers</li> <li>4. Bepaalde acties niet online plaatsen</li> </ol>	
5.	Duurzaam	<ol style="list-style-type: none"> <li>1. Subsidie werkt goed voor elektrisch rijden</li> </ol>	<ol style="list-style-type: none"> <li>1. Hubs te ver van stad</li> <li>2. Elektrische voertuig best duur</li> <li>3. Laadinfrastructuur, laadkosten en snelheid van laden</li> </ol>
6.	Goede arbeidsvoorwaarde	<ol style="list-style-type: none"> <li>1. Cao's</li> </ol>	<ol style="list-style-type: none"> <li>1. Meer salaris wordt onbetaalbaar voor bedrijven</li> </ol>
7.	Veilige stad	<ol style="list-style-type: none"> <li>1. Monitoren van chauffeurs</li> </ol>	
8.	Mindere kosten		<ol style="list-style-type: none"> <li>1. Klant niet bereid om te betalen</li> <li>2. Klant verwacht hoog serviceniveau</li> <li>3. Magazijn- en assortimentkosten</li> </ol>
9.	Waardering van bedrijf	<ol style="list-style-type: none"> <li>1. Picnic slim systeem is hoge waardering</li> </ol>	
10.	Lage overlast straat/buren	<ol style="list-style-type: none"> <li>1. Picnic gebruikt gewoon elektrische voertuigen met weinig overlast</li> </ol>	<ol style="list-style-type: none"> <li>1. Niet nadenken over type voertuigen</li> <li>2. Hoge frequentie</li> <li>3. Overheid laat nog steeds toe</li> <li>4. Als iemand anders doet dan doe ik het ook</li> </ol>
11.	Imago	<ol style="list-style-type: none"> <li>1. Niet vanuit winkel boodschappen pakken</li> </ol>	<ol style="list-style-type: none"> <li>1. Winkel en bezorgimago is niet te kopiëren</li> </ol>

Initial list of alternatives:

		<b>Doel</b>	<b>Alternatieven</b>
	1.	Gemak	1. Top 20 producten in een keer in mand
	2.	Winst	1. Niet tot aan keuken bezorgen 2. Als bedrijf tijdslots aanbieden die jou uitkomen 3. Serviceniveau omlaag
	3.	Groot marktaandeel	1. Focus op nichemarkten zoals baby.nl dat doet met luiers
	4.	Winkel voortbestaan	1. Winkel leuker maken
	5.	Duurzaam	1. Alles elektrisch maken 2. Last mile door een white label 3. Personeel uitwisselen of zelfde planning software
	6.	Goede arbeidsvoorwaarde	1. Robotiseren
	7.	Veilige stad	1. Trainen van bezorgers 2. Beter monitoren naar oorzaken bv. of iemand te hard reed
	8.	Mindere kosten	1. Automatiseren van hele keten
	9.	Waardering van bedrijf	1. Aparte bedrijven maken, zoals AH online
	10.	Lage overlast straat/buren	1. Voldoende laad- en losplekken 2. Bezorgrobot laten lopen 3. Kleinere voertuigen gebruiken bv. bakfiets
	11.	Imago	1. Beter interactie hebben met burens door vriendelijk en aardig te doen

## Interview 10

### Stakeholder information:

- Stakeholder group: Customer perspectives represented by independent researcher
- Function: Assistant professor sustainable logistics
- Date of interview: 28-11-2019

### Objectives:

		<b>Doel</b>	<b>Extra toelichting</b>
	1.	Lage kosten	
	2.	Lage CO <sub>2</sub> uitstoot	
	3.	Klein verschil in prestaties met winkels	
	4.	Punctueel	
	5.	Lage kosten klanten	
	6.	Lage vervoersbewegingen	

Success and failure factors:

		Doel	Succesfactor	Faalfactoren
				<ol style="list-style-type: none"> <li>1. Te veel logistieke middelen zoals warehouses en busjes die niet optimaal benut zijn</li> <li>2. Op terugweg een leeg busje</li> <li>3. Veel tijd kwijt aan juiste adres te vinden</li> <li>4. Tijd kwijt aan zoeken spullen in busje</li> <li>5. Ontvanger maakt graag praatjes, moet nog pinpas zoeken en gewend aan bezorging tot aan keuken</li> <li>6. Lange aanrijtijd door lage volume ver van stad een hub of distributiecentrum</li> <li>7. Winkellocaties zijn vaak al erg goed, dus weinig volume</li> <li>8. In winkel mogelijkheid tot substitutie als goederen ontbreken</li> <li>9. In winkel inspiratie opdoen van wat je kan eten</li> </ol>
1.		Lage kosten		
2.		Lage CO <sub>2</sub> uitstoot		<ol style="list-style-type: none"> <li>1. Geen belasting vanuit politiek voor het creëren van files of weg versperren</li> <li>2. Geen prioriteit</li> </ol>
3.		Klein verschil in prestaties met winkels		<ol style="list-style-type: none"> <li>1. Veel volume ontbreekt</li> </ol>
4.		Punctueel		<ol style="list-style-type: none"> <li>1. Soms door lage volume meer bestellingen van klanten stoppen in busje dan te doen is</li> </ol>
5.		Lage kosten klanten		<ol style="list-style-type: none"> <li>1. Door hoge kosten retailer</li> </ol>
6.		Lage vervoersbewegingen		<ol style="list-style-type: none"> <li>1. Geen logistieke efficiëntie</li> </ol>

Initial list of alternatives:

		<b>Doel</b>	<b>Alternatieven</b>
	1.	Lage kosten	1. Volume omhoog door subsidies
	2.	Lage CO <sub>2</sub> uitstoot	
	3.	Klein verschil in prestaties met winkels	
	4.	Punctueel	
	5.	Lage kosten klanten	
	6.	Lage vervoersbewegingen	1. Verbeteren volumes en bestelgedrag

## Grocery retailer – Bricks-and-Clicks company

### Interview 11

#### Stakeholder information:

- Stakeholder group: Grocery retailer – Bricks-and-clicks company
- Function: Strategy Director
- Date of interview: 5-11-2019

#### Objectives:

		<b>Doel</b>	<b>Extra toelichting</b>
	1.	Winstgevend	1. Kosten afhankelijk van adres en mandje
	2.	Tijdigheid	1. Perceptie van klant 2. Absolute meting van tijd 3. Vertrektijd
	3.	Kwaliteit	
	4.	Vriendelijkheid	
	5.	Compleetheid	

Success and failure factors:

		Doel	Succesfactor	Faalfactoren
	1.	Winstgevend		<ol style="list-style-type: none"> <li>1. Kosten van de klanten m.b.t. het rijden naar de winkel en producten pakken worden nu door supermarkt betaald</li> <li>2. Klanten eisen verse producten</li> </ol>
	2.	Tijdigheid	<ol style="list-style-type: none"> <li>1. Opleiding waarbij er wordt meegereden</li> <li>2. Specifieke metingen bv. welke teamleiders hebben bezorgers die vaak te laat zijn.</li> <li>3. Ervaren mensen behouden</li> </ol>	<ol style="list-style-type: none"> <li>1. Externe factoren zoals het weer, files en stakingen</li> <li>2. Gebrek aan goede data over klantstoptijd en interklant tijd.</li> </ol>
	3.	Kwaliteit	1. Koelboxen	<ol style="list-style-type: none"> <li>1. Producten niet goed in mandjes gedaan</li> <li>2. Temperatuur van de busjes kan te hoog zijn vooral in de zomer</li> <li>3. Problemen met oogst</li> </ol>
	4.	Vriendelijkheid		1. Leiderschap mist
	5.	Compleetheid		<ol style="list-style-type: none"> <li>1. Door externe leveranciers worden producten gemist</li> <li>2. Orderpicker pakt verkeerde producten</li> <li>3. Verkeerde mandjes leveren</li> <li>4. Bezorger moet producten bij elkaar pakken</li> </ol>

Initial list of alternatives:

		<b>Doel</b>	<b>Alternatieven</b>
	1.	Winstgevend	<p>Lange termijn:</p> <ol style="list-style-type: none"> <li>1. Mechanisatie van warehouse en fulfillment centers</li> <li>2. Algoritmes bedenken die ook breekbare producten kunnen oppakken</li> <li>3. Chaffeurloos rijden</li> </ol> <p>Korte termijn:</p> <ol style="list-style-type: none"> <li>1. Algoritmes bedenken om minder tijd kwijt te zijn om producten te pakken</li> <li>2. Met camera's controleren of alles gepakt is</li> <li>3. Algoritmes die constant checken of je meest efficiënte routes rijdt</li> </ol>
	2.	Tijdigheid	<ol style="list-style-type: none"> <li>1. Mensen beloningen geven</li> <li>2. Proactiever klanten informeren door te bellen en mailen</li> </ol>
	3.	Kwaliteit	<ol style="list-style-type: none"> <li>1. Door de hele keten verbeteren</li> </ol>
	4.	Vriendelijkheid	<ol style="list-style-type: none"> <li>1. Opleiding standardizatie in plaats van chauffeur op chauffeur</li> </ol>
	5.	Compleetheid	<ol style="list-style-type: none"> <li>1. Keten en algoritmes verbeteren</li> </ol>

## Interview 12

### Stakeholder information:

- Stakeholder group: Grocery retailer – Bricks-and-clicks company
- Function: Manager online operations
- Date of interview: 18-11-2019

### Objectives:

		<b>Doel</b>	<b>Extra toelichting</b>
	1.	Veel Nederlandse klanten bedienen	
	2.	Laagste kosten	
	3.	Tijdig	
	4.	Zonder fouten	
	5.	Klantvriendelijk	
	6.	Duurzaamheid	
	7.	Compleet	

Success and failure factors:

		<b>Doel</b>	<b>Succesfactor</b>	<b>Faalfactoren</b>
	1.	Veel Nederlandse klanten bedienen		1. Onvoldoende koppeling met supermarkt
	2.	Laagste kosten		1. Onvoldoende volume door te weinig informatie over gedrag consument en de eisen gerelateerd aan gemak 2. Niet juiste tijdsslot voor klanten 3. Busjes kosten nog veel 4. Te lange stoptijden
	3.	Tijdig		1. Gebrek aan ervaren bezorgers 2. Verschilende nieuwe klanten 3. Afstemming met klant onvoldoende 4. Files
	4.	Zonder fouten		1. Gebrek aan trainingen 2. Menselijke fouten 3. Nog onvoldoende makkelijk voor personeel
	5.	Klantvriendelijk		1. Gebrek aan techniek 2. Gebrek aan data 3. Onvoldoede begrip klantenwensen
	6.	Duurzaamheid		1. Rijden nog teveel kilometers 2. Kleine volume en actieradius van elektrische voertuigen
	7.	Compleet		1. Gebrek aan automatisering 2. Techniek ontbreekt 3. Investeringskosten 4. Geen software

## Grocery retailer – Pure player company

### Interview 13

#### Stakeholder information:

- Stakeholder group: Grocery retailer – Pure player company
- Function: Growth analyst
- Date of interview: 8-11-2019

#### Objectives:

		<b>Doel</b>	<b>Extra toelichting</b>
	1.	Lage tussentijden tussen drops	
	2.	Betrouwbaar	1. Op tijd bezorgen bij de klant
	3.	Klantvriendelijk	1. Runners zijn de uithangbord 2. Iets persoonlijks voor klanten 3. Klanten gemakkelijker maken
	4.	Duurzaam	
	5.	Lage kosten	
	6.	Veilig	

Success and failure factors:

		<b>Doel</b>	<b>Succesfactor</b>	<b>Faalfactoren</b>
	1.	Lage tussentijden tussen drops	<ol style="list-style-type: none"> <li>1. In plaats van taximodel een busmodel</li> <li>2. Geen offline supermarkt</li> <li>3. Vanaf begin een goed idee door bedrijven van hele wereld te analyseren</li> </ol>	
	2.	Betrouwbaar	<ol style="list-style-type: none"> <li>1. Data van adressen klanten en type gebouwen</li> <li>2. Goed algoritme en technologie</li> </ol>	
	3.	Klantvriendelijk	<ol style="list-style-type: none"> <li>1. Een goed eigen persoonlijk imago door extra services bv. Kleurplaten kinderen, stickers op bel als niet aangebeld mag worden, wagentjes een naam geven door klanten en kinderen laten meerijden</li> <li>2. Offline marketing team bestaat uit jonge mensen</li> <li>3. Vaak door zelfde runner bij adressen laten bezorgen</li> <li>4. Lokale producten aanbieden</li> </ol>	
	4.	Duurzaam	<ol style="list-style-type: none"> <li>1. Elektrische auto's door goed onderzoek</li> <li>2. Auto's met zonnepanelen pilot</li> </ol>	
	5.	Lage kosten		
	6.	Veilig	<ol style="list-style-type: none"> <li>1. In auto sensoren met hoe snel iemand rijdt en hoe scherp een bocht genomen moet worden</li> <li>2. Periodieke rijstyle meting voor bewustzijn</li> </ol>	

Initial list of alternatives:

		<b>Doel</b>	<b>Alternatieven</b>
	1.	Lage tussentijden tussen drops	
	2.	Betrouwbaar	
	3.	Klantvriendelijk	1. Meer producten terugnemen 2. Betere retouren
	4.	Duurzaam	1. Eigen stroom opwekken met zonnepanelen
	5.	Lage kosten	1. Langere range door grotere actieradius 2. Klanten aanbiedingen laten zien voor meer volume
	6.	Veilig	

## Interview 14

### Stakeholder information:

- Stakeholder group: Grocery retailer – Pure player company
- Function: Supply chain analyst
- Date of interview: 13-11-2019

### Objectives:

		Doel	Extra toelichting
	1.	Vers imago	1. Goede kwaliteit producten
	2.	Efficiënt bezorgen	1. Goedkoop bezorgen
	3.	Klantvriendelijk	
	4.	Milieuvriendelijk	

### Success and failure factors:

		Doel	Succesfactor	Faalfactoren
	1.	Vers imago	<ol style="list-style-type: none"> <li>1. First mover advantage</li> <li>2. Goede producten van hoge kwaliteit</li> </ol>	
	2.	Efficiënt bezorgen	<ol style="list-style-type: none"> <li>1. Track-and-trace aankomsttijd</li> <li>2. Dag van tevoren een tijdslot van 30 min</li> <li>3. Hubs op strategische plekken</li> </ol>	<ol style="list-style-type: none"> <li>1. Inefficiënt bij gebieden met lage volume</li> </ol>
	3.	Klantvriendelijk	<ol style="list-style-type: none"> <li>1. Klein begonnen met persoonlijke klantenservice</li> <li>2. Niet geld besparen op klantenservice</li> <li>3. Trainingen voor bezorgers</li> <li>4. Instructies met hoe het werkt</li> <li>5. Werkkleding</li> <li>6. Handgeschreven excuses berichten bij klachten</li> </ol>	<ol style="list-style-type: none"> <li>1. Slechte dag bezorger</li> </ol>
	4.	Milieuvriendelijk	<ol style="list-style-type: none"> <li>1. Warenhuizen duurzaam maken</li> </ol>	<ol style="list-style-type: none"> <li>1. Focus op lange termijn</li> </ol>

Initial list of alternatives:

		<b>Doel</b>	<b>Alternatieven</b>
	1.	Vers imago	1. Social media met promo van versheid
	2.	Efficiënt bezorgen	1. Bezorging in 5 dagen van de week 2. Voor woensdag bezorgd besteld moeten hebben en dan vanaf zaterdag geleverd
	3.	Klantvriendelijk	1. Flexibele abonnement die je kan stopzetten 2. Bezorger wacht op klant 3. Zelfde tijdslot kiezen zonder extra kosten
	4.	Milieuvriendelijk	1. Elektrische streefscooters gebruiken

## Delivery Company

### Interview 15

#### Stakeholder information:

- Stakeholder group: Delivery company
- Function: Product owner food
- Date of interview: 20-11-2019

#### Objectives:

		<b>Doel</b>	<b>Extra toelichting</b>
	1.	Hoge hit rate	1. Gemeten per uur tijdslot 2. Gemeten per vijf uur tijdslot 3. Gemeten in of klant thuis is
	2.	Communicatie richting ontvangers goed	1. Met betrekking tot afspraken waar en wanneer er bezorgd moet worden
	3.	Markt volwassener maken	1. Keten efficiënter maken 2. Keten slimmer maken

Success and failure factors:

		Doel	Succesfactor	Faalfactoren
	1.	Hoge hit rate	1. Veel data van pakketbezorging en van woningen en straten	<ol style="list-style-type: none"> <li>1. Files</li> <li>2. Ongeluk met chauffeur</li> <li>3. Verschillende leveranciers voor een rit</li> <li>4. Verschillende stoptijden door verschillende types woningen</li> <li>5. Slecht planning software die niet betrouwbaar is qua informatie</li> <li>6. Moeilijk goede chauffeurs vinden</li> <li>7. Veel rijtijd tussen stops</li> <li>8. Accurate informatie ontbreekt</li> <li>9. Statische data door geen software om die dynamisch aan te passen</li> </ol>
	2.	Communicatie richting ontvangers goed		<ol style="list-style-type: none"> <li>1. Communicatie klopt niet of is niet accuraat</li> <li>2. Vertraging door chauffeur niet doorgegeven</li> <li>3. Automatisering ontbreekt</li> <li>4. Je ziet bezorgwagen niet rijden op scherm van klant vanwege privacy</li> </ol>
	3.	Markt volwassener maken	<ol style="list-style-type: none"> <li>1. Veel momenten van de week aanbieden</li> <li>2. Eigen netwerk met eigen mensen</li> <li>3. Veel realisatiekracht door een manager die gelooft in online bezorgen van boodschappen</li> <li>4. Veel communiceren met partners en klanten</li> </ol>	<ol style="list-style-type: none"> <li>1. Investeren in markt</li> <li>2. Standardiseren in plaats van uitzonderingen maken voor klantenwensen</li> <li>3. Klant meer groeien in online</li> </ol>

Initial list of alternatives:

		<b>Doel</b>	<b>Alternatieven</b>
	1.	Hoge hit rate	1. Juiste info van stops naar ontvangers
	2.	Communicatie richting ontvangers goed	
	3.	Markt volwassener maken	1. Gerichter tijdsafspraken maken

## Civil Servant

### Interview 16

#### Stakeholder information:

- Stakeholder group: Civil servant
- Function: Projectmanager logistiek & smart mobility
- Date of interview: 12-11-2019

#### Objectives:

		Doel	Extra toelichting
	1.	Lage CO <sub>2</sub> uitstoot	
	2.	Lage vervoersbewegingen	
	3.	Laag aantal files	

#### Success and failure factors:

		Doel	Succesfactor	Faalfactoren
	1.	Lage CO <sub>2</sub> uitstoot	1. Lokale subsidies voor schone vervoersmiddelen en laadinfrastructuur	1. Passief overheid om marktwerking niet te verstoren 2. Coalitiesamenstelling 3. Kosten niet bij betreffende partijen
	2.	Lage vervoersbewegingen		
	3.	Laag aantal files		1. Ondernemers met goed concept mist 2. Moet aantrekkelijker worden voor consumenten

#### Initial list of alternatives:

		Doel	Alternatieven
	1.	Lage CO <sub>2</sub> uitstoot	1. Venstertijden voor elektrische voertuigen ruimer 2. Stadshub gefaciliteerd door overheid 3. Korting op elektrische voertuigen
	2.	Lage vervoersbewegingen	
	3.	Laag aantal files	

## Appendix E: Key stakeholders and the analysis of their objectives

Based on interviews with Accenture experts and independent researchers, four key stakeholders have been identified which objectives must be involved in the evaluation process. The first one is the perspectives from (both bricks-and-clicks and pure players) grocery retailers that provide the online grocery shopping service. The second group are the customers. This group is important since it directly impacts the objectives of the grocery retailers. The third group consists of deliverers. The performance of this group is very important for how customers perceive the customer service level and the cost-effectiveness for the last mile delivery of grocery retailers. The objectives of the delivery companies concerning the last mile delivery of groceries overlap with this group and the group of grocery retailers that also strives for an efficient last mile delivery. Even though more profit for delivery companies will most likely lead to more costs for grocery retailers, they both strive for more profit and less costs. Therefore, this stakeholder group is not specifically mentioned in the evaluation process. The last group consists of the objectives of the government. The Dutch government has many objectives and issues that needs to be taken into consideration. However, the government represent the objectives of other citizens that are impacted by the last mile delivery. These government objectives concerning city logistics are also taken into consideration by grocery retailers and thus should be involved in the evaluation process.

### Objectives of Grocery Retailers

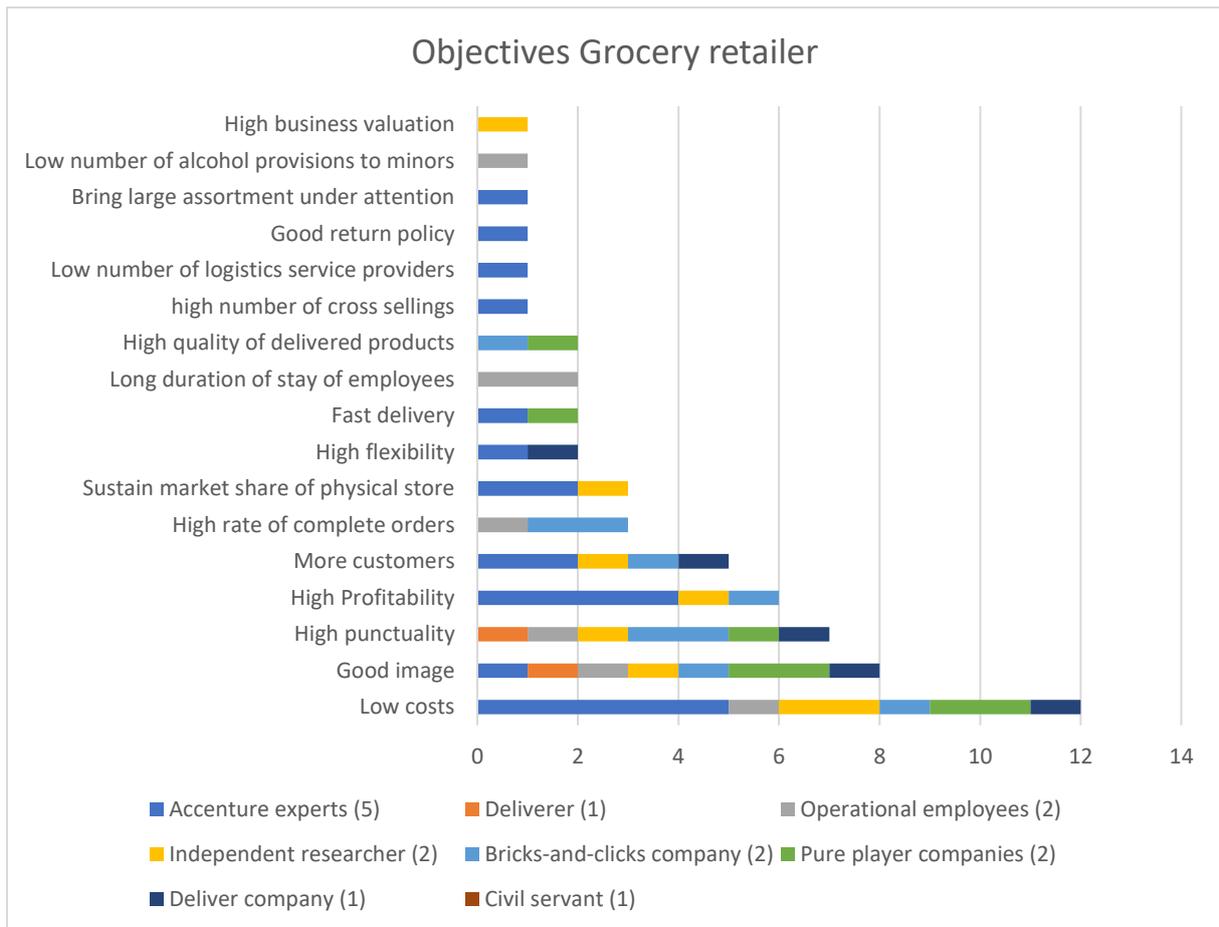
The obtained objectives of the grocery retailers are presented in table 30. Some objectives are taken together that have the same meaning but only have a different definition or scope e.g. low costs was mentioned as low inventory cost, low labor cost, low vehicle damage costs, efficient delivery, low costs between addresses and low costs while stopping at addresses. The different definitions are thus given in table 30.

**Table 30.** Definitions of the objectives of grocery retailers

	Objectives	Objectives definitions
1.	Low costs	Cost related objectives: 1. Low inventory costs 2. low labor cost 3. Low vehicle damage costs 4. Efficient delivery 5. Low costs between addresses 6. Low costs while stopping at addresses
2.	Good image	Objectives that influence the image of the grocery retailer: 1. Good service of the deliverer 2. Customer friendly 3. Seeing the brand in the streets 4. Image of the store 5. Good service to provide ease for customers 6. Personal contact with customer
3.	High punctuality	Time related objectives that influence the deliverer for being on time: 1. Departure time 2. Arrival time at customer 3. Reliable 4. Perception of punctuality or absolute measures of punctuality 5. Can be measured in promised time slot, chosen time slot or customer's punctuality for being home
4.	High Profitability	Profitability is related to the revenue minus the costs. The following definitions are given for it: 1. More sold products 2. Profitability depends on the revenue minus costs of address and orders
5.	More customers	More customers mean 1. a larger market share and 2. More "volume"
6.	High rate of complete orders	A complete order can be made if no mistakes are made by either parties.
7.	Sustain market share of physical store	Besides the fear of missing out and to comply with customers' online needs, the bricks-and-clicks companies also must sustain their stores
8.	High flexibility	The grocery retailers try to make the supply chain as smart as possible in order to be flexible
9.	Fast delivery	Fast delivery will lower travel time for same delivery.

10.	Long duration of stay of employees	Employees will stay longer if you have: 1. motivated employees 2. Involved employee
11.	High quality of delivered products	The products must remain fresh.
12.	high number of cross selling	Selling products of different suppliers.
13.	Low number of logistics service providers	Less logistics service providers can be achieved by having less partners that deliver for a company.
14.	Good return policy	The return policies concern what deliverers take back from customers.
15.	Bring large assortment under attention	This objective concerns the awareness of the whole assortment.
16.	Low number of alcohol provisions to minors	This objective complies with the legal minimum age to buy alcohol.
17.	High business valuation	This is the value of a company.

The frequency that an interviewee mentioned one of the objectives presented in table 30 can be seen in figure 16. All the experts and some stakeholders have mentioned low costs as the most important objective to achieve for enhancing the viability of online grocery shopping (total of 12 out of 16 experts and stakeholders). This is in line with the statements made by Punakivi et al. (2001) that said that the cost-effectiveness has been the largest challenge in the last mile delivery of grocery orders. They also argued that it is very challenging to combine companies' profitability and a high consumer service level. These are respectively the second (good image is mentioned 8 out of 16 interviews) and fourth (high profitability is mentioned 6 out of 16 interviews) most mentioned objectives. A good image will lead to more customers, which will lead to more efficient deliveries and thus lower costs and a higher profitability. According to researches by Amit & Zott (2011), Rappa (2004) and Bouwman & MacInnes (2006), scalability is the key factor for the success of these internet-based business models. Surprisingly, this has only been mentioned in 5 out of 16 interviews specifically but is still relevant to consider. The third most mentioned objective is punctuality (7 out of 16 interviews). This objective is mentioned by every stakeholder group or expert group except for the civil servant. This punctuality is endangered by fluctuating natural conditions, different product flows from different suppliers and variety in quality and quantity, which require complex dependencies among the actors in the supply chain of e-groceries (Frederiksson & Liljestr and, 2015). This also endangers the seventh most mentioned objective, namely high rate of complete orders. This objective is also very important to take into consideration since it belongs to the KPI's of both the interviewed bricks-and-clicks companies. Other objectives are also important or could be taken together with other objectives e.g. High profitability can lead to a high business valuation, but the most important according to these interviews are: 1. Low costs, 2. Good image, 3. High punctuality, 4. high profitability, 5. More customers and 6. A high rate of complete orders. These are validated with a bricks-and-clicks company that also used other KPI's or descriptions for reaching the same objectives.



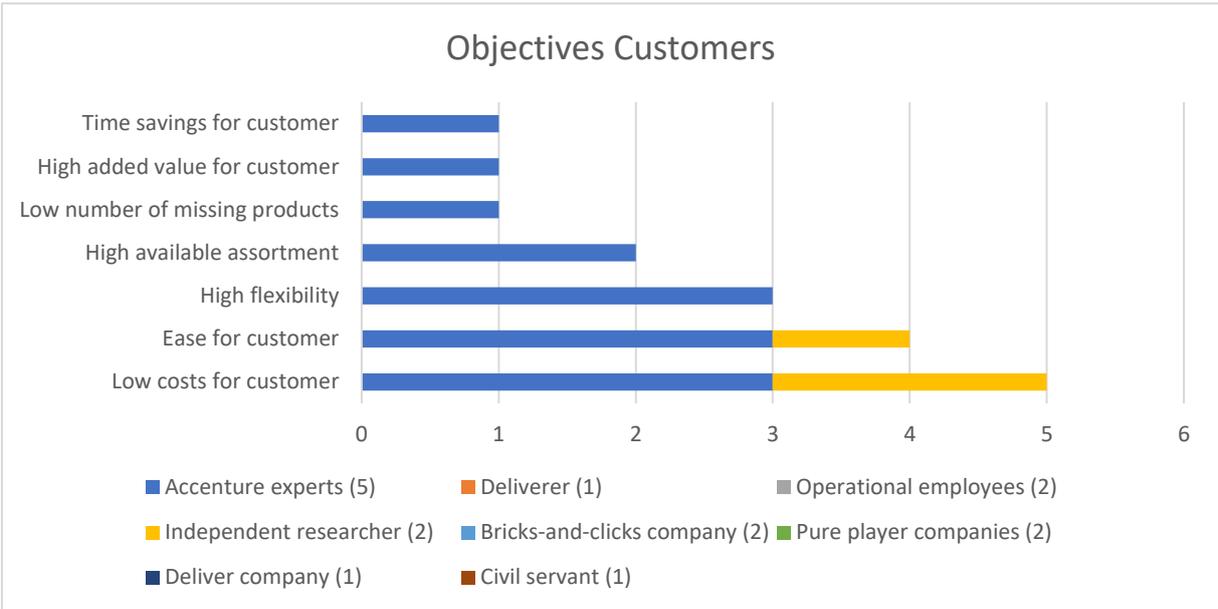
**Figure 16.** Frequency of mentioned objectives of grocery retailers by interviewees

### Objectives of customers

The customers' objectives and definitions are presented in table 31. These objectives are obtained from interviews with experts that are also customers. The results of the interviews are presented in figure 17. These objectives can be compared with the results of the survey of Motivaction (2019) among Dutch customers described in section 4.1.1. The most mentioned objective is low costs for customers (5 out of 7 experts). This is in line with the results of Motivaction (2019) that named no delivery cost as an important factor to prefer doing groceries in the physical store over doing online grocery shopping. Besides, 55% of the customers also mentioned that they are more price conscience online compared to offline. The second most named objective is ease for customers (4 out of 7 experts). Many reasons can be combined into the objective ease for customers e.g. delivery until the kitchen shorter online order time due to better recommendations. Time savings (1 out of 7 experts) and flexibility (3 out of 7 experts) are also mentioned. However, these objectives can also be reached by providing ease for customers. According to Raijas & Tuunainen (2001), components of time saving are ease of ordering and ease of finding products. Besides, if flexibility is offered to customers e.g. that customers can directly return products, this leads to ease for customers since they also save time. Therefore, only 1. low costs for customers and 2. ease for customers will be considered as the most important customer objectives.

**Table 31.** Definitions of the objectives of customers

Objectives		Objectives definitions
1.	Low costs for customer	All price and costs related objectives: 1. Low delivery costs 2. Low subscription costs 3. Low minimum price
2.	Ease for customer	Everything that makes it easier for customers: 1. Recommendations for making order process easier 2. Easy way of paying 3. Delivering to the kitchen 4. Comply with needs customer 5. Having right groceries at right moment 6. Good assortment that suits needs of customers 7. Not going to the store with children anymore 8. Order from any place 9. Saving list of groceries for next order 10. Getting fresh products from home 12. No hassle due to incomplete orders 13. Reliable arrival time
3.	High flexibility	Providing service that is in line with what suits customer the best: 1. Deliver products whenever customer wants 2. choosing own time slots 3. change orders 4. options for returning products
4.	High available assortment	Objectives that give customers more options: 1. Large assortment 2. Availability of products
5.	Low number of missing products	No mistakes made in picking or delivering.
6.	High added value for customer	This must lead to more benefits compared with doing groceries in the physical store.
7.	Time savings for customer	The total time spent on doing groceries must be reduced.



**Figure 17.** Frequency of mentioned objectives of customers by interviewees

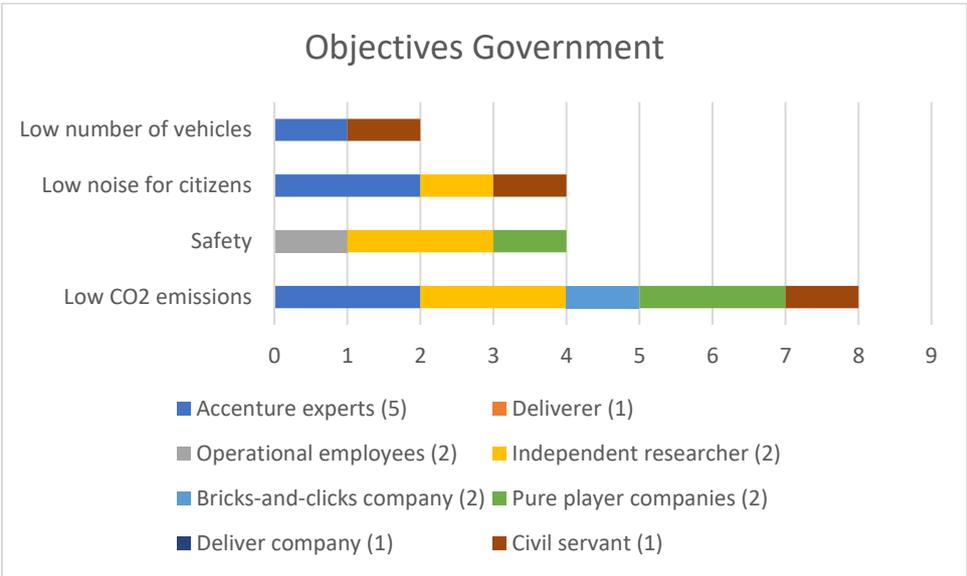
**Objectives of government**

The objectives of government related to last mile delivery issues are presented in table 32. Four objectives have been identified that are in line with the traditional societal last mile challenges such as increasing number of vehicle movements, which is associated with more congestion, more noise in the urban areas, more pollution and worse traffic safety level (Quak & Van Duin, 2010). The results of the interviews are presented in figure 18. As can be seen in figure 18, low CO<sub>2</sub> emissions is most mentioned by the interviewees (8 out of 16 interviewees). The Dutch government’s goal is to halve the CO<sub>2</sub> emissions in 2030 compared to 1990 (Rijksoverheid, 2019). Since a quarter of the CO<sub>2</sub>

emissions is caused by the transport sector, this objective is very important (Rijksoverheid, 2019). Safety has not been mentioned as a major objective by the civil servant. Besides lower CO<sub>2</sub> emissions, the most important objective according to an empirical research by the researcher is the noise for citizens (it is also mentioned 4 out of the 16 interviews). During a day at the job, the neighbor of a customer couldn't leave his parking spot due to a delivery vehicle that blocked him. Besides, grocery delivery vehicles are seen in the streets almost every day, which causes noise. Thus, the most important governmental objectives are 1. Low CO<sub>2</sub> emissions and 2. Low noise for citizens.

**Table 32.** Definitions of the objectives of government

Objectives		Objectives definitions
1.	Low CO <sub>2</sub> emissions	Less pollution
2.	Low noise for citizens	Everything that can annoy citizens: 1. Blocked roads 2. Congestions
3.	Low number of vehicles	The number of vehicle movements can be higher due to inefficient deliveries or more customers
4.	Safety	Safety can be defined for either the citizens or the deliverers and is thus defined as: 1. Safety for the city 2. Safety for the deliverers



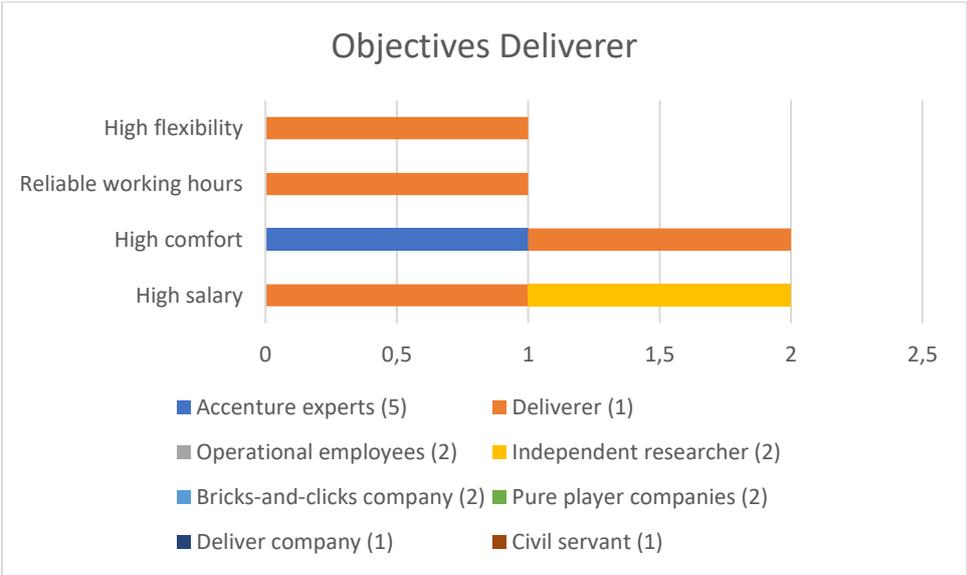
**Figure 18.** Frequency of mentioned objectives of government by interviewees

**Objectives of deliverers**

Part of the objectives of deliverers are presented in table 33. As can be seen in figure 16, the deliverer of a grocery retailer also shares same objectives with grocery retailers such as punctuality and a good image. The other objectives are presented in figure 19. Two objectives are mentioned twice. A high salary is a general objective of every employee. However, collective agreements on salary will make it difficult to enhance this. Besides, a deliverer has validated that they already get paid well and that it is not the most important objective for them. On the other side, comfort is something that can be enhanced. This involves everything in the whole last mile delivery process from leaving the hubs to the customer interaction. This is the only objective that needs to be considered, which is validated with an Accenture expert.

**Table 33.** Definitions of the objectives of government

	Objectives	Objectives definitions
1.	High salary	Salary received according to the labor agreement
2.	High comfort	Everything that leads to ease for deliverers: 1. Efficient delivery 2. Comfortable working clothes 3. Food for during the ride 4. Not solving problems of other deliverers
3.	Reliable working hours	Reliable working hours mean that deliverers want to work at moments they are expecting to work.
4.	High flexibility	Flexible in scheduling working days, hours and shifts.



**Figure 19.** Frequency of mentioned objectives of government by interviewees

## Appendix F. Success and failure factors identification

Category	Success factor	Total #
<b>IT</b>	AI algorithms to predict what will be ordered for lower inventory cost	1
	Good algorithm and technology to predict travel time	1
	Track-and-trace of the arrival time will lower costs per delivery	1
	<b>Data of the addresses of the customers will enhance the punctuality</b>	2
<b>Finance</b>	Merging departments leads to more investments in technological means	1
<b>Marketing</b>	Advertisement via vehicles for good image	1
	Electric vehicles enhance the image on a company	1
	<b>First mover advantage for high profit or certain image</b>	3
	Offline marketing team that consists of young people are more successful	1
<b>Merchandising</b>	Discounts help people notice more products	1
	Discounts based on volume of the orders enhances market share	1
	Certain discounts are only available in the stores and not online	1
	Professional work clothes for good image	1
<b>Sourcing</b>	Offering local products in order to enhance the image	1
	High quality of products enhances the image	1
	Ordering products after knowing the exact demand will lead to lower inventory cost	1
	Similar images help enhancing number of cross selling	1
<b>Socio-cultural</b>	Adding instructions for the delivery service to educate the market	1
<b>Market</b>	Good initial plan by analyzing all the systems in the market has led to more efficiencies	1
<b>Public Policy</b>	<b>Electric vehicles for lower CO<sub>2</sub> emissions and noise from the beginning</b>	3
	Good CO <sub>2</sub> policy from the beginning for lower CO <sub>2</sub> emissions	1
	<b>Subsidy will enhance the use of electric vehicles</b>	2
<b>Other external factors</b>		0
<b>Legal</b>	Collective agreements on salaries can assure employees a certain salary	1
<b>Online</b>	Public champion that believes in the viability of e-grocery for enhancing number of customers	1
	Smart system enhances the valuation of a company	2
	More time between ordering and delivery for more efficient delivery	1
	One day before delivery receiving the time window will lower costs per delivery	1
	Good customer experience helps enhancing number of cross selling	1
	<b>Offering a lot of time slots options for flexibility</b>	3
	Products that are missing online means that customers still go to the stores	1
	Extra services for certain target groups to enhance image	1
	<b>Stores</b>	<b>No physical store means less costs</b>
	Already having a lot of customers from the physical stores can lead to more online profit	1
	Fresh products in stores will sustain the physical store	1
	Certain crucial products will let people go to the stores	1
	No picking from stores enhances image due to competition of products with customers	1

<b>Distribution center and hubs</b>	Efficient handling system for lower inventory cost	1
	Lower inventory means lower number of employees	1
	Sustainable warehouses for lower CO <sub>2</sub> emissions	1
	Strategic positions of the hubs for more lower costs per delivery	1
<b>Transport and Delivery</b>	Using cooler boxes will help sustain the quality of the groceries	1
	(turns and speed) sensors in vehicles for safety	1
	Electrical vehicles with solar panels for lower CO <sub>2</sub> emissions	1
	<b>Saving time by not delivering until kitchen</b>	2
	Using a bus concept instead of a taxi concept leads to lower travel time between customers	1
	High responsibility for deliverers leads to high salary for deliverers	1
	Same deliverer at same addresses to enhance image	1
	Communication with customers and partners will help enhance the delivery service	1
	Own delivery network with own deliverers enhances the delivery service	1
	<b>Evaluating performance measures with deliverers enhances punctuality</b>	5
	Easy delivery routes for employees who has also helped with the loading	1
<b>Human Resources</b>	Offering functions with reliable hours enhances the duration of stay of employees	1
	High demand for deliverers forces delivery companies to be more flexible	1
	Keeping more experienced workers for higher punctuality	1
	<b>Better practical trainings enhance the punctuality and image</b>	2
	<b>Career conversations with team leader or agent will lead to more reliable working hours</b>	2
	Good performance in the past has led to more flexibility for deliverers	1
<b>Customer Service</b>	From the beginning a personal customer service on enhancing image	1
	No money savings on customer service for enhancing image	1
	Writing personal letters if customers have serious complaints for better image	1

Category:	Failure factor	Total #
<b>IT</b>	Technological complexity of showing real time stock on website or app	1
	<b>Difficult to predict behaviors of customers for fast delivery at the right moment for the customer</b>	5
	Better recommendations of popular products for higher profit	1
	<b>Unreliable planning parameters/software are used that leads to less punctual predictions</b>	2
	Difficult to recognize patterns in data to enhance profitability	1
	<b>IT challenge to create the store's image on website or app to attract loyal customers</b>	2
	less inspiration for customers on what to buy and eat compared to the experience in stores	1
	No software for automatic provision of real time delivery information to customers	1
	<b>Wrong predictions lead to no stock availability</b>	2
	<b>Better technology to help customers make their orders</b>	2
<b>Finance</b>	<b>High investments costs for (electric) vehicles</b>	3
	<b>High investments costs for charging infrastructure leads to less electric vehicles adoption</b>	2
	Low budget allocation to making the website more user friendly	1
	High salaries for employees will lead to more costs for companies	1
	High investment costs to automate processes for picking	1
	High investments needed for making the supply chain efficient and smarter	1
	Burden of stores has led to low economies of scale, which means higher costs	1
<b>Marketing</b>	Lack of education of customers for doing online grocery shopping	1
<b>Merchandising</b>	No attraction of loyal customers that are used of a certain brand	1
	No professional clothes for deliverers might be bad for the reputation of grocery retailers	1
<b>Sourcing</b>	Shorter expiration date leads to less willingness for customers to do online grocery shopping	1
	Late arrival of products by suppliers might lead to incomplete order delivery	1
	Incomplete order by grocery retailer leads to incomplete order delivery	1
	Slow response time leads to the unavailability of stock	1
	<b>Wrong predictions of the perishability of products leads to unavailability of stock and more costs</b>	2
	Fixed costs of internal purchase price of products by grocery retailers at suppliers means low margins	1
	<b>Wrong number of products delivered by supplier leads to no stock availability or incomplete order delivery</b>	2
<b>Socio-cultural</b>	High costs for customers lead to higher expectations of grocery retailers that impacts its flexibility	1
	Disloyal customers mean less profits, since they go to competitors	1
	Customer might not do online grocery shopping if they cannot purchase the products, they can buy in stores	1
	Customers have low willingness to pay for the delivery costs which means that grocery retailers have higher costs	1
	Flexibility for customers not necessary, but leads to higher costs for grocery retailers	1

	Customers want fresh products that means more costs for grocery retailers	1
	Some customers prefer to order small quantities, which leads to low profitability	1
	Customers that are hesitant to order online groceries will not do online grocery shopping	1
	Customers don't like to order groceries in advance	1
	Customers prefer to do their own groceries in physical stores	1
	<b>Customer is used of a certain price for groceries and thus finds online grocery shopping more expensive</b>	2
<b>Market</b>	<b>Customer is spoiled by other online delivery services (cheap, fast and good delivery) that leads to high costs</b>	2
	Competition takes large part of online groceries, which means less profitability	1
<b>Public policy</b>	<b>No interception or tax by government means no lower noise or congestions</b>	3
	The coalition of political parties determine the amount of focus on CO <sub>2</sub> reduction policies	1
<b>Other external factors</b>	High temperature in the vehicles due to weather might lead to worse quality of the products	1
	<b>External factors e.g. weather, congestions and strikes lead to lower punctuality</b>	3
	Problems with harvest lead to worse quality of products	1
<b>Legal</b>	If one logistics service provider can cause noise, then others will follow	1
	No real-time location of vehicle due to privacy reasons	1
<b>Online</b>	Little use of recipes to order groceries leads to less profitability	1
	High minimum order price is not desirable for customers	1
	Smaller time slots for more flexibility for customers	1
	The lack of opportunity to add last moment products leads to less ease for customers	1
	Not being able to feel products leads to less ease for customers	1
	No substitution of groceries if orders are incomplete	1
<b>Stores</b>	No urge to do online grocery shopping due to good locations of stores	1
	Internal competition between offline and online stores that leads to no stock availability	1
<b>DC and Hubs</b>	Lack of technology that makes picking groceries easier which leads to less mistakes	1
	Late planning and filling vehicles lead to inefficiencies and slower deliveries which leads to higher costs	1
	Big warehouses with a lot of inventory leads to high costs	1
	<b>Small inventory space might lead to no stock availability and small assortment</b>	2
	<b>Large distance between hubs or distribution center and customer causes a lot of CO<sub>2</sub> emissions</b>	4
	If pickers don't pack the orders in a right way this might lead to worse quality of the products	1
	Lack of trainings for preventing human mistakes at picking complete orders	1
<b>Transport and Delivery</b>	<b>Small profits on return policies will lead to less focus on enhancing return policies</b>	2
	Technological complexity of having no alternative vehicles with high capacity that produce no emissions	1
	<b>Low range and volume of sustainable delivery vehicles leads to more usage of unsustainable vehicles</b>	2
	<b>More customers will enable more flexible deliveries in order to provide ease for customer</b>	2
	Only delivering in crowded areas means lower total market share	1

	High delivery frequency leads to more noise for the citizens	1
	<b>No focus on reducing CO<sub>2</sub> emissions</b>	2
	Not taking time to design a vehicle that can cause less noise leads to more noise for the citizens	1
	Lack of facilities to make it comfortable for the deliverers might lead to an early exit of the deliverer	1
	Sometimes dirty vehicles due to lazy behavior of deliverers leads to less comfort for other deliverers	1
	<b>Lack of experience leads to deliverers being less punctual</b>	3
	No career opportunities as deliverer leads to low demand of deliverers	1
	<b>No reliable working hours leads to less motivated workers and the urge to leave the company</b>	2
	<b>Bad attitude of deliverer when they block the streets causes bad image of the company</b>	3
	Punctuality pressure causes bad behavior of deliverers towards other citizens which causes a bad image	1
	Accidents with driver leads to lower punctuality	1
	<b>Human mistakes during deliverers picking the crates leads to incomplete order delivery</b>	3
	Missing educators that take the lead to enhance the customer friendliness of deliverers	1
	Bad or no communication and governance among departments that offer delivery services leads to inefficiencies	1
	<b>Lack of communication between customer and logistics service providers leads to lower punctuality</b>	2
	Large distance between customers leads to lower punctuality	1
	<b>Little data of time spent at addresses of customers and travel times of all the routes leads to lower punctualities</b>	3
	Lack of dynamic planning technology means slower deliveries	1
	Less punctual due to the lack of customers that has led to too much load that must be delivered in one go.	1
	<b>Time spent on finding right address leads to high costs</b>	3
	A lot of time spent on delivery to the kitchen means high costs	1
	A lot of time spent on paying at the door, which leads to high costs	1
	Talkative customers lead to longer delivery time and thus high costs	1
	<b>Lack of volume means no fast delivery and higher costs</b>	4
	<b>High delivery costs lead to high costs for customers and thus lower smaller market share</b>	2
	Inefficient to consolidate delivery orders due to extra handling costs leads to high number of vehicles	1
	Lock-in of current fleet of unsustainable vehicles means no investments in electric vehicles	1
	High costs for many aspects of the delivery service leads to low profits	2
	<b>High costs grocery retailer for delivering and picking of products means high costs for customers</b>	2
	Lack of entrepreneurs that focus on less vehicle movements and create a good concept to solve this	1
	<b>Not making use of optimal capacity of fleet and warehouses leads to high costs and much vehicle movements</b>	2
	<b>Inefficient designed delivery vehicles mean higher costs for picking products</b>	2

	Traditional way of thinking about the supply chain has led to inflexibilities for customers and retailer	1
<b>Human Resources</b>	<b>Limited availability of employees for lower flexibility opportunities</b>	2
	A lot of part time students leads to low duration of stay employees	1
	Miscommunication between HR planners and employees leads to less reliable working hours	1
<b>Customer service</b>	Lack of standardized customer service procedures for customer wishes or complains lead to high costs	1

## Appendix G. Alternatives elicited from interviews with stakeholders and experts

Failure factors	Initial list of alternatives from interviews
<ol style="list-style-type: none"> <li>1. Customers prefer to do groceries in (mostly nearby) physical stores</li> <li>2. Customers don't like to do groceries in advance because they don't know what to eat</li> <li>3. Customers want to feel fresh products or know the expiration date before buying it</li> <li>4. Customers buy less online due to more cost consciences if they buy online and less impulse buys and thus might not reach the minimum order price</li> <li>5. Customer is used of a certain brand</li> </ol>	<ol style="list-style-type: none"> <li>1.1 To nudge customers</li> <li>1.2 Reduce time of ordering or waiting at the door</li> <li>1.3 Offering certain products only online</li> <li>1.4 Offering same price for substitution products if a certain product cannot be delivered</li> <li>1.5 <b>Offering flexible subscriptions that can easily be terminated</b></li> <li>1.6 Take back more products will also be favored by customers who go to physical stores</li> <li>2.1 More accurate volumes offered when ordering products from recipes for a certain number of persons</li> <li>2.2 <b>Offering same day delivery for people who don't know what to eat</b></li> <li>2.3 <b>Same day delivery at locations where a lot of people work or come together</b></li> <li>2.4 Large billboard with inspiration of food</li> <li>3.1 Allowing customers to choose their fresh products at the door</li> <li>3.2 <b>Use social media to promote the freshness of the products</b></li> <li>4.1 VR or AR to shop in a virtual store to get inspired</li> <li>4.2 Bringing groceries to the door that the customer might want</li> <li>4.3 Show more discounts for more volume</li> <li>4.4 <b>Offering discounts to products that are usually ordered together</b></li> <li>5.1 <b>Providing switching service for using other brands</b></li> <li>5.2 To combine delivery services of e.g. Bol.com with grocery deliveries</li> <li>5.3 <b>Offering free products</b></li> <li>5.4 Focus on niche markets e.g. diapers</li> </ol>
<ol style="list-style-type: none"> <li>6. Ideal time slots (day and time)</li> <li>7. Availability of preferred assortment or substitutes</li> <li>8. The lack of opportunity to add products last moment</li> <li>9. Lack of recommendation of groceries that the customer might want</li> </ol>	<ol style="list-style-type: none"> <li>6.1 Start with a blank sheet and ask customers when they want to have the groceries delivered and then build a business model around it.</li> <li>6.2 <b>To allow customers to pre-claim time slots</b></li> <li>6.3 Choosing same timeslot will not be charged</li> </ol>

<p>10. Lack of communication with customer and deliverer about arrival time</p>	<p>6.4 Local pick-up point by having a huge freezer and refrigerator in the neighborhood</p> <p>7.1 Make a deal with suppliers to let them have the inventory costs in order to provide more products to customers.</p> <p><b>7.2 To bring substitutes to the doors if certain products are not available</b></p> <p>7.3 To make use of inventory of stores to offer complete orders</p> <p>7.4 To have certain products in hubs</p> <p>8.1 Allow to adapt list of orders and delivery time after the current time limits</p> <p><b>8.2 Pilot of a dynamic Uber/meal delivery-system with GPS, but then with groceries deliverers.</b></p> <p>9.1 Offer a list of recommended products in the apps</p> <p><b>9.2 Top 10 products directly in the bucket</b></p> <p><b>10.1 More proactive communication with customer by calling or sending mails</b></p> <p>10.2 Sending right information of stops to the customers</p>
<p>11. Lack of data of (new) addresses</p> <p>12. No accurate routing time information</p> <p>13. Lack of experienced deliverers e.g. due to no reliable working hours</p> <p>14. High investments costs for electric vehicles and charging infrastructure and lock-in of current fleet of unsustainable vehicles that can carry more volume and have a larger range than electric vehicles</p> <p>15. Inefficient to consolidate deliveries of different grocery retailers due to extra handling costs</p>	<p><b>11.1 Obtaining more data during every delivery</b></p> <p><b>11.2 Obtaining data of the type of delivery locations e.g. high-rise or low-rise</b></p> <p>12.1 Obtaining more data during every delivery</p> <p>12.2 Making the streets more suitable for grocery deliveries</p> <p><b>12.3 Using reliable communication tools such as a good planner</b></p> <p>12.4 Algorithms that constantly check whether the driver drives the most efficient route or not</p> <p>13.1 Making the delivery shifts less heavy</p> <p>13.2 Always offer constant working hours</p> <p>13.3 Hire people with an interest in logistics</p> <p><b>13.4 Using same planning software as other companies in order to share a pole of deliverers</b></p> <p>13.5 Automatize the whole chain</p> <p>13.6 Delivery robot</p> <p>13.7 Driverless delivery</p> <p><b>14.1 Sustainable in other ways than using electric vehicles e.g. better return policy of batteries, clothes or old plastic</b></p> <p>14.2 (e-)Bike with large capacity</p>

	<p>14.3 Use solar panels on the vehicles to increase the range of electric vehicles</p> <p>14.4 Broader timeslot for electric vehicles to enter city centers</p> <p>14.5 Discounts on electric vehicles</p> <p>15.1 DC and hubs closer to the customers</p> <p>15.2 One party that do all the last mile deliveries (perhaps as white label)</p> <p>15.3 <b>Having at least 2 days between the ordering and delivering will enhance the efficiency</b></p> <p>15.4 Using a hub to consolidate groceries at a government funded hub</p>
<p>16. Efficient payment system e.g. people still needs to get the payment cards, or the machine does not work</p> <p>17. People still need to return bottles or crates</p> <p>18. Talkative customers during delivery until kitchen</p> <p>19. Efficient way of finding groceries in the vehicle with no human mistakes</p> <p>20. Better trainings or evaluations for unsafe or impolite behaviors of drivers</p>	<p>16.1 <b>Use direct debit for paying</b></p> <p>17.1 <b>Reward people for being on time</b></p> <p>18.1 <b>No delivery until kitchen</b></p> <p>19.1 Robotize in order to prevent human mistakes</p> <p>19.2 <b>Better algorithm that can assure completeness of the grocery orders e.g. better ordering of the crates/boxes/plastic bags in the vehicles</b></p> <p>20.1 Using a rating system</p> <p>20.2 Asking what can be improved after every delivery</p> <p>20.3 More training on driving backwards since this causes 70% of the damages</p> <p>20.4 Driving simulations</p> <p>20.5 To train educators of drivers better</p> <p>20.6 Detention if damage is made on the vehicles</p> <p>20.7 Better monitoring of causes of misbehaviors of deliverers.</p> <p>20.8 <b>Standardized training instead of personalized training from driver to driver</b></p>

## Appendix H. Brainstorm session documents

Theme	Key question	Failure factors
Efficient customer service	1. How do we build scale?	<ol style="list-style-type: none"> <li>1. Customers prefer to do groceries in (mostly nearby) physical stores</li> <li>2. Customers don't like to do groceries in advance because they don't know what to eat</li> <li>3. Customers want to feel fresh products or know the expiration date before buying it</li> <li>4. Customers buy less online due to more cost consciences if they buy online and less impulse buys and thus might not reach the minimum order price</li> <li>5. Customer is used of a certain brand</li> </ol>
	2. How do we keep the customers satisfied?	<ol style="list-style-type: none"> <li>6. Ideal time slots (day and time)</li> <li>7. Availability of preferred assortment or substitutes</li> <li>8. The lack of opportunity to add products last moment</li> <li>9. Lack of recommendation of groceries that the customer might want</li> <li>10. Lack of communication with customer and deliverer about arrival time</li> </ol>
Efficient delivery	3. How can the (new) addresses be reached in an efficient and sustainable way?	<ol style="list-style-type: none"> <li>11. Lack of data of (new) addresses</li> <li>12. No accurate routing time information</li> <li>13. Lack of experienced deliverers e.g. due to no reliable working hours</li> <li>14. High investments costs for electric vehicles and charging infrastructure and lock-in of current fleet of unsustainable vehicles that can carry more volume and have a larger range than electric vehicles</li> <li>15. Inefficient to consolidate deliveries of different grocery retailers due to extra handling costs</li> </ol>
	4. How can the delivery at the customers' place be more efficient?	<ol style="list-style-type: none"> <li>16. Efficient payment system e.g. people still needs to get the payment cards, or the machine does not work</li> <li>17. People still need to return bottles or crates</li> <li>18. Talkative customers during delivery until kitchen</li> <li>19. Efficient way of finding groceries in the vehicle with no human mistakes</li> <li>20. Better trainings or evaluations for unsafe or impolite behaviors of drivers</li> </ol>

Failure factors	Initial list of alternatives
<ol style="list-style-type: none"> <li>1. Customers prefer to do groceries in (mostly nearby) physical stores</li> <li>2. Customers don't like to do groceries in advance because they don't know what to eat</li> <li>3. Customers want to feel fresh products or know the expiration date before buying it</li> <li>4. Customers buy less online due to more cost consciences if they buy online and less impulse buys and thus might not reach the minimum order price</li> <li>5. Customer is used of a certain brand</li> </ol>	<ul style="list-style-type: none"> <li>- Providing switching service for using other brands</li> <li>- To nudge customers</li> <li>- VR or AR to shop in a virtual store to get inspired</li> <li>- More accurate volumes offered that customers get when ordering products from recipes for a certain amount of persons</li> <li>- To combine delivery services of e.g. Bol.com with grocery deliveries</li> <li>- Provide products in preserving jars</li> <li>- Allowing customers to choose their fresh products at the door</li> <li>- Reduce time of ordering or waiting at the door</li> <li>- Offering discounts to products that are usually ordered together</li> <li>- Offering certain products only online</li> <li>- Offering same day delivery for people who don't know what to eat</li> <li>- Same day delivery at locations where a lot of people work or come together</li> <li>- Large billboard with inspiration of food</li> <li>- Offering free products</li> <li>- Bringing groceries to the door that the customer might want</li> <li>- Offering same price for substitution products if a certain product cannot be delivered</li> <li>- Focus on niche markets e.g. diapers</li> <li>- Show more discounts for more volume</li> <li>- Use social media to promote the freshness of the products</li> <li>- Offering flexible subscriptions that can easily be terminated</li> </ul>
<ol style="list-style-type: none"> <li>6. Ideal time slots (day and time)</li> <li>7. Availability of preferred assortment or substitutes</li> <li>8. The lack of opportunity to add products last moment</li> <li>9. Lack of recommendation of groceries that the customer might want</li> <li>10. Lack of communication with customer and deliverer about arrival time</li> </ol>	<ul style="list-style-type: none"> <li>- Pilot of a dynamic Uber-system with GPS, but then with groceries deliverers.</li> <li>- Start with a blank sheet and ask customers when they want to have the groceries delivered and then build a business model around it.</li> <li>- Make a deal with suppliers to let them have the inventory costs in order to provide more products to customers</li> <li>- To allow customers to pre-claim time slots</li> </ul>

	<ul style="list-style-type: none"> <li>- To bring substitutes to the doors if certain products are not available</li> <li>- To bring certain products from stores</li> <li>- To have certain products in hubs</li> <li>- Offer a list of recommended products in the apps</li> <li>- Allow to adapt list of orders and delivery time after the current time limits</li> <li>- To make use of inventory of stores to offer complete orders</li> <li>- Top 20 products directly in the bucket</li> <li>- More proactive communication with customer by calling or sending mails</li> <li>- Better algorithm that can assure completeness of the grocery orders</li> <li>- Take back more products will also be favored by customers</li> <li>- Choosing same timeslot will not be charged.</li> <li>- Sending right information of stops to the customers</li> </ul>
<ol style="list-style-type: none"> <li>11. Lack of data of (new) addresses</li> <li>12. No accurate routing time information</li> <li>13. Lack of experienced deliverers e.g. due to no reliable working hours</li> <li>14. High investments costs for electric vehicles and charging infrastructure and lock-in of current fleet of unsustainable vehicles that can carry more volume and have a larger range than electric vehicles</li> <li>15. Inefficient to consolidate deliveries of different grocery retailers due to extra handling costs</li> </ol>	<ul style="list-style-type: none"> <li>- DC and hubs closer to the customers</li> <li>- Sustainable in other ways than using electric vehicles e.g. better return policy of batteries, clothes or old plastic</li> <li>- (e-)Bike with large capacity</li> <li>- Obtaining more data during every delivery</li> <li>- Obtaining data of the type of delivery locations e.g. high-rise or low-rise</li> <li>- Making the streets more suitable for grocery deliveries</li> <li>- One party that do all the last mile deliveries (perhaps as white label)</li> <li>- Using reliable communication tools such as a good planner</li> <li>- Making the deliveries of groceries less heavy</li> <li>- Always offer constant working hours</li> <li>- Hire people with an interest in logistics</li> <li>- Using same planning software as other companies in order to share a pole of deliverers</li> <li>- Automatize the whole chain</li> <li>- Delivery robot</li> <li>- Driverless delivery</li> <li>- Algorithms that constantly check whether the driver drives the most efficient route or not</li> </ul>

	<ul style="list-style-type: none"> <li>- Use solar panels on the vehicles to increase the range of electric vehicles</li> <li>- Having at least 2 days between the ordering and delivering will enhance the efficiency</li> <li>- Broader timeslot for electric vehicles to enter city centers</li> <li>- Using a hub to consolidate groceries at a government funded hub</li> <li>- Discounts on electric vehicles</li> </ul>
<ol style="list-style-type: none"> <li>16. Efficient payment system e.g. people still needs to get the payment cards, or the machine does not work</li> <li>17. People still need to return bottles or crates</li> <li>18. Talkative customers during delivery until kitchen</li> <li>19. Efficient way of finding groceries in the vehicle with no human mistakes</li> <li>20. Better trainings or evaluations for unsafe or impolite behaviors of drivers</li> </ol>	<ul style="list-style-type: none"> <li>- Local pick-up point by having a huge freezer and refrigerator in the neighborhood</li> <li>- Using a rating system</li> <li>- Asking what can be improved after every delivery</li> <li>- More training on driving backwards since this causes 70% of the damages</li> <li>- Driving simulations</li> <li>- To train educators of drivers better</li> <li>- Detention if damage is made on the vehicles</li> <li>- Use direct debit for paying</li> <li>- No delivery until kitchen</li> <li>- Better monitoring of causes of misbehaviors of deliverers.</li> <li>- Robotize in order to prevent human mistakes</li> <li>- Reward people for being on time</li> <li>- Standardized training instead of personalized training from driver to driver</li> </ul>

## Appendix I. Alternatives elicited from the brainstorm session

Failure factors	Initial list of alternatives from brainstorm session
<ol style="list-style-type: none"> <li>1. Customers prefer to do groceries in (mostly nearby) physical stores</li> <li>2. Customers don't like to do groceries in advance because they don't know what to eat</li> <li>3. Customers want to feel fresh products or know the expiration date before buying it</li> <li>4. Customers buy less online due to more cost consciences if they buy online and less impulse buys and thus might not reach the minimum order price</li> <li>5. Customer is used of a certain brand</li> </ol>	<ol style="list-style-type: none"> <li>1.1 <b>Use smart packaging that can track the volume of a certain product and give a signal to the grocery retailer that the product must be renewed</b></li> <li>2.1 <b>Incentivize these people to shop online with loyalty/reward programs</b></li> <li>2.2 The variety of products according to people needs can be used in marketing advertisements</li> <li>2.3 Give people recipe suggestions</li> <li>3.1 <b>Be sure to always send fresh products and show expiration date and any other information clearly, however if products are of less quality then less information should be provided</b></li> <li>3.2 This is also not always possible in stores. Thus, have a freshness ensures policy for online orders.</li> <li>4.1 <b>Show people an automatic trade-off system of having a certain minimum order price or paying certain delivery costs</b></li> <li>5.1 <b>Compare all the products in the market with your product on the website</b></li> </ol>
<ol style="list-style-type: none"> <li>6. Ideal time slots (day and time)</li> <li>7. Availability of preferred assortment or substitutes</li> <li>8. The lack of opportunity to add products last moment</li> <li>9. Lack of recommendation of groceries that the customer might want</li> <li>10. Lack of communication with customer and deliverer about arrival time</li> </ol>	<ol style="list-style-type: none"> <li>6.1 <b>Amazon boxes for 'not at home' delivery including cool boxes</b></li> <li>6.2 Real-time data sharing from driver to customer that can adapt</li> <li>7.1 Lowest price guarantee</li> <li>7.2 Good loyalty program</li> <li>7.3 <b>Automatic suitable presents and free products when products are unavailable</b></li> <li>7.4 Offer both premium brands and cheap brands</li> <li>8.1 <b>One-click check out to add these products</b></li> <li>8.2 Give customers a time frame in which they can order</li> <li>9.1 <b>Ask people if they would like to buy certain products more often within an asked time span via the app</b></li> <li>10.1 <b>Message to customer pop-ups 5 minutes before arrival</b></li> </ol>
<ol style="list-style-type: none"> <li>11. Lack of data of (new) addresses</li> <li>12. No accurate routing time information</li> <li>13. Lack of experienced deliverers e.g. due to no reliable working hours</li> <li>14. High investments costs for electric vehicles and charging infrastructure and</li> </ol>	<ol style="list-style-type: none"> <li>11.1 <b>Use customer loyalty programs to gather data relevant for delivery in order to better plan next deliveries and allow drivers to write special circumstances on customer's profile</b></li> </ol>

<p>lock-in of current fleet of unsustainable vehicles that can carry more volume and have a larger range than electric vehicles</p> <p>15. Inefficient to consolidate deliveries of different grocery retailers due to extra handling costs</p>	<p>11.2 Have planning algorithms based on real-time data and historic data</p> <p>11.3 Request detailed information during sign-up</p> <p>12.1 Also use the customer loyalty program to gather data</p> <p>12.2 Work with data and routing expert partners; perhaps partnership with Google Maps to improve delivery routes or copy Picnic’s route model</p> <p><b>12.3 Have planning algorithms based on real-time data and historic data</b></p> <p>13.1 Make a list of best practices to train new deliverers for a good onboarding program</p> <p><b>13.2 A digital interface that provides a delivery checklist that guide delivery people</b></p> <p>13.3 Partnerships with third parties to cover peak loads</p> <p>14.1 Promote that you are sustainable in other ways</p> <p><b>14.2 Need to find vehicle re-use strategies for existing fleet (perhaps an app to rent these vehicles)</b></p> <p>14.3 Need to invest in electric vehicles for new demand over current network</p> <p>14.4 Cost-benefit analysis for fleet transition and ask for government subsidies given the gap</p> <p>15.1 Have an efficient distribution center</p> <p>15.2 Differentiate in shared and differentiated assets e.g. differentiate in tech and algorithms, but co-invest in ideal vehicle type</p> <p><b>15.3 Co-develop delivery standards like internet web shops that could be accompanied by delivery companies such as PostNL</b></p>
<p>16. Efficient payment system e.g. people still needs to get the payment cards, or the machine does not work</p> <p>17. People still need to return bottles or crates</p> <p>18. Talkative customers during delivery until kitchen</p> <p>19. Efficient way of finding groceries in the vehicle with no human mistakes</p> <p>20. Better trainings or evaluations for unsafe or impolite behaviors of drivers</p>	<p><b>16.1 Connected payment options with PayPal or credit card to customer’s supermarket profile that pays automatically and can be combined with customer stimulation to make use of this service by providing points if a card is added</b></p> <p>16.2 Automatic on-click payment</p> <p>16.3 Reward if people pre-pay via Ideal or credit card and educate the group that don’t do this due to lack of awareness.</p>

	<p>17.1 <b>Smart packages connected to apps that can send a reminder to bring bottles and crates to reimburse money when the deliverer almost reached the address.</b></p> <p>17.2 Notification to customers 5 minutes before arrival that require real-time delivery status and gamification by rewarding customer with points for saving time</p> <p>18.1 <b>Options in app to let customers choose a preferred treatment by the deliverer e.g. talkative, assisted placement, customer helping with collecting the groceries or silent &amp; drop</b></p> <p>19.1 Automated vehicle assistant which is a robot that collects orders while driving</p> <p>19.2 <b>Signing with a device where the groceries are for a certain customer</b></p> <p>20.1 <b>Screening employees by letting customers give a review on the deliverer</b></p>
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# Appendix J. Survey Thesis on the Viability of Online Grocery Delivery in the Netherlands

## 1. Rating the importance of the identified key questions to enhance the viability of online grocery delivery in the Netherlands

For every question, the following Likert scale can be used to rate:

- 1=Unimportant
- 2=Slightly important
- 3=Moderately important
- 4=Important
- 5=Very important

Objectives	1	2	3	4	5
1. Low costs for grocery retailers					
2. Good image					
3. High punctuality					
4. High profitability					
5. More customers					
6. High rate of complete orders					
7. Low costs for customers					
8. Ease for customers					
9. Low CO <sub>2</sub> emissions					
10. Low noise for citizens					
11. More comfort for deliverers					

Key questions	1	2	3	4	5
• How do we build scale?					
• How do we keep the customers satisfied?					
• How can the (new) addresses be reached in an efficient and sustainable way?					
• How can the delivery at the customers' place be more efficient?					

## 2. Rating identified success and failure factors on level of importance for the viability of online grocery delivery in the Netherlands

**Questions 1-10** are factors related to achieve an efficient customer service to scale (1-5) and satisfy customers (6-10). **Questions 11-20** are factors related to achieve an efficient delivery by efficiently and sustainably reach the addresses (11-15) and by being more efficient at the place of the customer (16-20).

The following Likert scale of importance can be used:

1=Unimportant

2=Slightly important

3=Moderately important

4=Important

5=Very important

Success and failure factor	1	2	3	4	5
1. Customers prefer to do groceries in (mostly nearby) physical stores					
2. Customers don't like to do groceries in advance because they don't know what to eat					
3. Customers want to feel fresh products or know the expiration date before buying it					
4. Customers buy less online due to more cost consciences if they buy online and less impulse buys and thus might not reach the minimum order price					
5. Customer is used to a certain brand					
6. Ideal time slots (day and time)					
7. Availability of preferred assortment or substitutes					
8. The lack of opportunity to add products last moment					
9. Lack of recommendation of groceries that the customer might want					
10. Lack of communication with customer and deliverer about arrival time					
11. Lack of data of (new) addresses					
12. No accurate routing time information					
13. Lack of experienced deliverers e.g. due to no reliable working hours					
14. High investments costs for electric vehicles and charging infrastructure and lock-in of current fleet of unsustainable vehicles that can carry more volume and have a larger range than electric vehicles					
15. Inefficient to consolidate deliveries of different grocery retailers due to extra handling costs					
16. Efficient payment system e.g. people still needs to get the payment cards, or the machine does not work					
17. People still need to return bottles or crates					
18. Talkative customers during delivery until kitchen					
19. Efficient way of finding groceries in the vehicle with no human mistakes					
20. Better trainings or evaluations for unsafe or impolite behaviors of drivers					

### 3. Alternatives for every success and failure factor

For every (20) success and failure factors, three alternatives are given that might help overcoming the success or failure factors and thus enhance the viability of online grocery shopping in the Netherlands. These alternatives are retrieved from 1. Interviews with stakeholders and experts 2. Outside in brainstorm session 3. researcher

	Interviews with stakeholders and experts	Outside in brainstorm session	Researcher
1.	Offering flexible subscriptions that can easily be terminated	Use smart packaging that can track the volume of a certain product and give a signal to the grocery retailer that the product must be renewed	AR to shop in a virtual store
2.	Offering same day delivery for people who don't know what to eat at locations where a lot of people work or come together	Incentivize these people to shop online with promotions and loyalty points	Help to make a week planner of what to eat and what groceries are needed for a certain number of people
3.	Use social media to promote the freshness of the products	Be sure to always send fresh products and show expiration date and any other information clearly, however if products are of less quality then less information should be provided	Show options of the freshness of the product that is preferred e.g. expiration date of milk between 1-2 days (35% discount) or 3-7 days.
4.	Offering discounts to products that are usually ordered together	Show people an automatic trade-off system of having a certain minimum order price or paying certain delivery costs	AR to shop in a virtual store to get inspired
5.	Providing switching service for using other brands e.g. offering free products	Compare all the products in the market with your product on the website	Showing substitutes with information on the popularity of a certain product and the benefits
6.	To allow customers to pre-claim time slots	Amazon boxes for 'not at home' delivery including cool boxes	Customers put on their profiles on what day of the week and moment of the day they are available for receiving grocery deliveries and based on this, the app will propose time slots
7.	To bring substitutes to the doors if certain products are not available	Automatic suitable presents and free products when products are unavailable	Ask reason for having a product and then propose substitutes e.g. not having a "snack cucumber"; Customer giving the reason to have a healthy snack and then website or app propose

			“snack tomatoes” and “cucumber”.
8.	Pilot of a dynamic Uber/meal delivery-system with GPS, but then with groceries deliverers.	One-click check out to add these products	To every customer a set of personal preferred products will be proposed, and the opportunity is given to add products until an hour before a deliverer departs the hub or DC and then 2 times a day, a vehicle picks up these products from the most nearby store and bring it to the hub or DC.
9.	Top 10 products directly in the bucket	Ask people if they would like to buy certain products more often within an asked time span via the app	At every tab of category of products, the discounted or most picked products by the customer are proposed
10.	More proactive communication with customer by calling or sending mails	Message to customer pop-ups 5 minutes before arrival	Using a bus-concept of showing at which (anonymized) stop a deliverer is and how much delay every customer can expect given an exact arrival time
11.	Obtaining more data of the type of delivery locations e.g. high-rise or low-rise, during every delivery	Use customer loyalty programs to gather data relevant for delivery in order to better plan next deliveries and allow drivers to write special circumstances on customer’s profile	At every address the deliverer must note what has been different or surprising by having Waze-app concept
12.	Using reliable communication tools such as a good planner	Have planning algorithms based on real-time data and historic data	Integrate the addresses in Google Maps to have the most efficient routes with real life circumstances
13.	Using same planning software as other companies in order to share a pole of deliverers	A digital interface that provides a delivery checklist that guide delivery people	Give promotions, add more responsibility to deliverers with a higher ranking and thus being able to offer more reliable hours
14.	Sustainable in other ways than using electric vehicles e.g. better return policy of batteries, clothes or old plastic	Need to find vehicle re-use strategies for existing fleet (perhaps an app to rent these vehicles)	Negotiation with government about subsidizes for the costs involved in replacing current fleet with electrical vehicles and making a long-term plan that can lead to pay back part of the subsidy if it has not been reached
15.	Having at least 2 days between the ordering and	Co-develop delivery standards like internet web shops that	Letting one company delivering all the groceries

	delivering will enhance the efficiency	could be accompanied by delivery companies such as PostNL	with the label of all the partners on the vehicles and clothes, assuring that benefits will be made per order for the grocery retailers and challenging the logistics service provider to achieve benefits from an efficient last mile delivery e.g. PostNL took over Sandd in order to make the postal delivery more efficient
16.	Use direct debit for paying	Connected payment options with PayPal or credit card to customer's supermarket profile that pays automatically and can be combined with customer stimulation to make use of this service by providing points if a card is added	As for all the web shops nowadays, only allow payment via Ideal with debit card, credit card or PayPal
17.	Reward people for being on time	Smart packages connected to apps that can send a reminder to bring bottles and crates to reimburse money when the deliverer almost reached the address.	Send a message to customers on the moment they receive the estimated arrival time and one when deliverer is leaving the previous customer to have the bottles, crates or packages ready.
18.	No delivery until kitchen	Options in app to let customers choose a preferred treatment by the deliverer e.g. talkative, assisted placement, customer helping with collecting the groceries or silent & drop	Sending a message when deliverer is leaving the previous customer with a standardized apology message and that he or she will hurry to deliver the groceries as soon as possible to the designated customer and the following customers.
19.	Better algorithm that can assure completeness of the grocery orders e.g. better ordering of the crates/boxes/plastic bags in the vehicles	Signing with a device where the groceries are for a certain customer	AR to help the deliverer to pick the groceries in the right order and will confirm if it is complete.
20.	Standardized training instead of personalized training from driver to driver	Screening employees by letting customers give a review on the deliverer	Using a rating system and opportunity to give tips to the deliverer, which will be evaluated by the team leaders and can lead to more standardized paid trainings in a classroom which is financed by the received tips.



4. Best alternative to overcome this success or failure factor is: 1 2 3

<b>Customers buy less online due to more cost consciences if they buy online and less impulse buys and thus might not reach the minimum order price</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
1. Offering discounts to products that are usually ordered together					
2. Show people an automatic trade-off system of having a certain minimum order price or paying certain delivery costs					
3. AR to shop in a virtual store to get inspired					

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5. Best alternative to overcome this success or failure factor is: 1 2 3

<b>Customer is used to a certain brand</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
1. Providing switching service for using other brands e.g. offering free products					
2. Compare all the products in the market with your product on the website					
3. Showing substitutes with information on the popularity of a certain product and the benefits					

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6. Best alternative to overcome this success or failure factor is: 1 2 3

<b>Ideal time slots (day and time)</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
1. To allow customers to pre-claim time slots					
2. Amazon boxes for 'not at home' delivery including cool boxes					
3. Customers put on their profiles on what day of the week and moment of the day they are available for receiving grocery deliveries and based on this, the app will propose time slots					

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7. Best alternative to overcome this success or failure factor is: 1 2 3

<b>Availability of preferred assortment or substitutes</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
1. To bring substitutes to the doors if certain products are not available					
2. Automatic suitable presents and free products when products are unavailable					
3. Ask reason for having a product and then propose substitutes e.g. not having a "snack cucumber"; Customer giving the reason to have a healthy snack and then website or app propose "snack tomatoes" and "cucumber".					

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8. Best alternative to overcome this success or failure factor is: 1 2 3

<b>The lack of opportunity to add products last moment</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
1. Pilot of a dynamic Uber/meal delivery-system with GPS, but then with groceries deliverers.					
2. One-click check out to add these products					
3. To every customer a set of personal preferred products will be proposed, and the opportunity is given to add products until an hour before a deliverer departs the hub or DC and then 2 times a day, a vehicle picks up these products from the most nearby store and bring it to the hub or DC.					

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9. Best alternative to overcome this success or failure factor is: 1 2 3

<b>Lack of recommendation of groceries that the customer might want</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
1. Top 10 products directly in the bucket					
2. Ask people if they would like to buy certain products more often within an asked time span via the app					
3. At every tab of category of products, the discounted or most picked products by the customer are proposed					

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10. Best alternative to overcome this success or failure factor is: 1 2 3

<b>Lack of communication with customer and deliverer about arrival time</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
1. More proactive communication with customer by calling or sending mails					
2. Message to customer pop-ups 5 minutes before arrival					
3. Using a bus-concept of showing at which (anonymized) stop a deliverer is and how much delay every customer can expect given an exact arrival time					

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11. Best alternative to overcome this success or failure factor is: 1 2 3

<b>Lack of data of (new) addresses</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
1. Obtaining more data of the type of delivery locations e.g. highOrise or low-rise, during every delivery					
2. Use customer loyalty programs to gather data relevant for delivery in order to better plan next deliveries and allow drivers to write special circumstances on customer's profile					
3. At every address the deliverer must note what has been different or surprising by having Waze-app concept					

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12. Best alternative to overcome this success or failure factor is: 1 2 3

<b>No accurate routing time information</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
1. Using reliable communication tools such as a good planner					
2. Have planning algorithms based on real-time data and historic data					
3. Integrate the addresses in Google Maps to have the most efficient routes with real life circumstances					

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13. Best alternative to overcome this success or failure factor is: 1 2 3

<b>Lack of experienced deliverers e.g. due to no reliable working hours</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
1. Using same planning software as other companies in order to share a pool of deliverers					
2. A digital interface that provides a delivery checklist that guide delivery people					
3. Give promotions, add more responsibility to deliverers with a higher ranking and thus being able to offer more reliable hours					

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14. Best alternative to overcome this success or failure factor is: 1 2 3

<b>High investments costs for electric vehicles and charging infrastructure and lock-in of current fleet of unsustainable vehicles that can carry more volume and have a larger range than electric vehicles</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
1. Sustainable in other ways than using electric vehicles e.g. better return policy of batteries, clothes or old plastic					
2. Need to find vehicle re-use strategies for existing fleet (perhaps an app to rent these vehicles)					
3. Negotiation with government about subsidizes for the costs involved in replacing current fleet with electrical vehicles and making a long-term plan that can lead to pay back part of the subsidy if it has not been reached					

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15. Best alternative to overcome this success or failure factor is: 1 2 3

<b>Inefficient to consolidate deliveries of different grocery retailers due to extra handling costs</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
1. Having at least 2 days between the ordering and delivering will enhance the efficiency					
2. Co-develop delivery standards like internet web shops that could be accompanied by delivery companies such as PostNL					
3. Letting one company delivering all the groceries with the label of all the partners on the vehicles and clothes, assuring that benefits will be made per order for the grocery retailers and challenging the logistics service provider to achieve benefits from an efficient last mile delivery e.g. PostNL took over Sandd in order to make the postal delivery more efficient					

16. Best alternative to overcome this success or failure factor is: 1 2 3

<b>Efficient payment system e.g. people still needs to get the payment cards, or the machine does not work</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
1. Use direct debit for paying					
2. Connected payment options with PayPal or credit card to customer's supermarket profile that pays automatically and can be combined with customer stimulation to make use of this service by providing points if a card is added					
3. As for all the web shops nowadays, only allow payment via Ideal with debit card, credit card or PayPal					

17. Best alternative to overcome this success or failure factor is: 1 2 3

<b>People still need to return bottles or crates</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
1. Reward people for being on time					
2. Smart packages connected to apps that can send a reminder to bring bottles and crates to reimburse money when the deliverer almost reached the address.					
3. Send a message to customers on the moment they receive the estimated arrival time and one when deliverer is leaving the previous customer to have the bottles, crates or packages ready.					

18. Best alternative to overcome this success or failure factor is: 1 2 3

<b>Talkative customers during delivery until kitchen</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
1. No delivery until kitchen					
2. Options in app to let customers choose a preferred treatment by the deliverer e.g. talkative, assisted placement, customer helping with collecting the groceries or silent & drop					
3. Sending a message when deliverer is leaving the previous customer with a standardized apology message and that he or she will hurry to deliver the groceries as soon as possible to the designated customer and the following customers.					

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19. Best alternative to overcome this success or failure factor is: 1 2 3

<b>Efficient way of finding groceries in the vehicle with no human mistakes</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
1. Better algorithm that can assure completeness of the grocery orders e.g. better ordering of the crates/boxes/plastic bags in the vehicles					
2. Signing with a device where the groceries are for a certain customer					
3. AR to help the deliverer to pick the groceries in the right order and will confirm if it is complete.					

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20. Best alternative to overcome this success or failure factor is: 1 2 3

<b>Better trainings or evaluations for unsafe or impolite behaviors of drivers</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
1. Standardized training instead of personalized training from driver to driver					
2. Screening employees by letting customers give a review on the deliverer					
3. Using a rating system and opportunity to give tips to the deliverer, which will be evaluated by the team leaders and can lead to more standardized paid trainings in a classroom which is financed by the received tips.					

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## 5. Scoring best alternatives on stakeholders' objectives

In order to measure the effectiveness and acceptance of the best alternatives, every alternative will be scored on the stakeholders' objectives. Please fill in 1-5 in every box.

The following Likert scale of likelihood can be used to rate:

1= - - =very negative impact

2= - = negative impact

3= +/- = no/barely any impact

4= + = positive impact

5= + + = Very positive impact

Objectives	Best alternatives																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
6. Low costs for grocery retailers																				
7. Good image																				
8. High punctuality																				
9. High profitability																				
10. More customers																				
11. High rate of complete orders																				
12. Low costs for customers																				
13. Ease for customers																				
14. Low CO <sub>2</sub> emissions																				
15. Low noise for citizens																				
16. More comfort for deliverers																				

## Appendix K. Results of survey

### Interview 1

#### Stakeholder information:

- Stakeholder group: Grocery retailer – Bricks-and-clicks company
- Function: Dept. Director Marketing and E-commerce
- Date of interview: 22-01-2020

### **1. Rating the importance of the objectives and identified key questions to enhance the viability of online grocery delivery in the Netherlands**

For every question, the following Likert scale can be used to rate:

1=Unimportant

2=Slightly important

3=Moderately important

4=Important

5=Very important

<b>Objectives</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
1. Low costs for grocery retailers					X
2. Good image					X
3. High punctuality					X
4. High profitability					X
5. More customers					X
6. High rate of complete orders					X
7. Low costs for customers				X	
8. Ease for customers				X	
9. Low CO <sub>2</sub> emissions				X	
10. Low noise for citizens				X	
11. More comfort for deliverers				X	

<b>Key questions</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
1. How do we build scale?				X	
2. How do we keep the customers satisfied?				X	
3. How can the (new) addresses be reached in an efficient and sustainable way?					X
4. How can the delivery at the customers' place be more efficient?			X		

Comment: the reason why question 4 is moderately important in comparison with the other key questions, is because it is an operational question whereas the others are on a strategic level.

## 2. Rating identified success and failure factors on level of importance for the viability of online grocery delivery in the Netherlands

**Questions 1-10** are factors related to achieve an efficient customer service to scale (1-5) and satisfy customers (6-10). **Questions 11-20** are factors related to achieve an efficient delivery by efficiently and sustainably reach the addresses (11-15) and by being more efficient at the place of the customer (16-20).

The following Likert scale of importance can be used:

1=Unimportant

2=Slightly important

3=Moderately important

4=Important

5=Very important

Success and failure factor	1	2	3	4	5
1. Customers prefer to do groceries in (mostly nearby) physical stores				X	
2. Customers don't like to do groceries in advance because they don't know what to eat			X		
3. Customers want to feel fresh products or know the expiration date before buying it		X			
4. Customers buy less online due to more cost consciences if they buy online and less impulse buys and thus might not reach the minimum order price		X			
5. Customer is used to a certain brand		X			
6. Ideal time slots (day and time)				X	
7. Availability of preferred assortment or substitutes				X	
8. The lack of opportunity to add products last moment		X			
9. Lack of recommendation of groceries that the customer might want			X		
10. Lack of communication with customer and deliverer about arrival time					X
11. Lack of data of (new) addresses				X	
12. No accurate routing time information				X	
13. Lack of experienced deliverers e.g. due to no reliable working hours				X	
14. High investments costs for electric vehicles and charging infrastructure and lock-in of current fleet of unsustainable vehicles that can carry more volume and have a larger range than electric vehicles					X
15. Inefficient to consolidate deliveries of different grocery retailers due to extra handling costs			X		
16. Efficient payment system e.g. people still needs to get the payment cards, or the machine does not work			X		
17. People still need to return bottles or crates			X		
18. Talkative customers during delivery until kitchen			X		
19. Efficient way of finding groceries in the vehicle with no human mistakes			X		
20. Better trainings or evaluations for unsafe or impolite behaviors of drivers			X		

### 3. Alternatives for every success and failure factor

For every (20) success and failure factors, three alternatives are given that might help overcoming the success or failure factors and thus enhance the viability of online grocery shopping in the Netherlands. These alternatives are retrieved from 1. Interviews with stakeholders and experts 2. Outside in brainstorm session 3. Researcher. The preferred alternatives are green. High potential alternatives are orange and the preferred combined solutions are blue (counted as a halve preferred solution). Notes are given in red.

	Interviews with stakeholders and experts (3 were preferred)	Outside in brainstorm session (6 were preferred)	Researcher (11 were preferred)
1.	Offering flexible subscriptions that can easily be terminated (Note: no alternative is preferred, so this one is the least worst solution)	Use smart packaging that can track the volume of a certain product and give a signal to the grocery retailer that the product must be renewed	AR to shop in a virtual store (Note: it is a big investment, which makes it less likely)
2.	Offering same day delivery for people who don't know what to eat at locations where a lot of people work or come together	Incentivize these people to shop online with promotions and loyalty points	Help to make a week planner of what to eat and what groceries are needed for a certain number of people
3.	Use social media to promote the freshness of the products	Be sure to always send fresh products and show expiration date and any other information clearly, however if products are of less quality then less information should be provided	Show options of the freshness of the product that is preferred e.g. expiration date of milk between 1-2 days (35% discount) or 3-7 days.
4.	Offering discounts to products that are usually ordered together	Show people an automatic trade-off system of having a certain minimum order price or paying certain delivery costs (Note: since it is most easy to understand by customers)	AR to shop in a virtual store to get inspired
5.	Providing switching service for using other brands e.g. offering free products	Compare all the products in the market with your product on the website	Showing substitutes with information on the popularity of a certain product and the benefits
6.	To allow customers to pre-claim time slots (Note: best short-term plan)	Amazon boxes for 'not at home' delivery including cool boxes (Note: best long-term idea since less drivers are needed, less coordination and offers opportunity to deliver to one place with a larger vehicle. Government should be	Customers put on their profiles on what day of the week and moment of the day they are available for receiving grocery deliveries and based on this, the app will propose time slots

		involved to develop the streets that allows this innovation)	
7.	To bring substitutes to the doors if certain products are not available	Automatic suitable presents and free products when products are unavailable	Ask reason for having a product and then propose substitutes e.g. not having a “snack cucumber”; Customer giving the reason to have a healthy snack and then website or app propose “snack tomatoes” and “cucumber”.
8.	Pilot of a dynamic Uber/meal delivery-system with GPS, but then with groceries deliverers.	One-click check out to add these products (Note: Amazon dash button)	To every customer a set of personal preferred products will be proposed, and the opportunity is given to add products until an hour before a deliverer departs the hub or DC and then 2 times a day, a vehicle picks up these products from the most nearby store and bring it to the hub or DC.
9.	Top 10 products directly in the bucket	Ask people if they would like to buy certain products more often within an asked time span via the app	At every tab of category of products, the discounted or most picked products by the customer are proposed
10.	More proactive communication with customer by calling or sending mails	Message to customer pop-ups 5 minutes before arrival	Using a bus-concept of showing at which (anonymized) stop a deliverer is and how much delay every customer can expect given an exact arrival time
11.	Obtaining more data of the type of delivery locations e.g. high-rise or low-rise, during every delivery	Use customer loyalty programs to gather data relevant for delivery in order to better plan next deliveries and allow drivers to write special circumstances on customer’s profile (Note: combine it with their CRM)	At every address the deliverer must note what has been different or surprising by having Waze-app concept
12.	Using reliable communication tools such as a good planner	Have planning algorithms based on real-time data and historic data (Note: best is to have everything based on real-time data and Google maps is a good tool for that)	Integrate the addresses in Google Maps to have the most efficient routes with real life circumstances

13.	Using same planning software as other companies in order to share a pool of deliverers	A digital interface that provides a delivery checklist that guide delivery people	Give promotions, add more responsibility to deliverers with a higher ranking and thus being able to offer more reliable hours (Note: this is proved in practice to be a good solution to keep good experienced workers)
14.	Sustainable in other ways than using electric vehicles e.g. better return policy of batteries, clothes or old plastic	Need to find vehicle re-use strategies for existing fleet (perhaps an app to rent these vehicles)	Negotiation with government about subsidies for the costs involved in replacing current fleet with electrical vehicles and making a long-term plan that can lead to pay back part of the subsidy if it has not been reached
15.	Having at least 2 days between the ordering and delivering will enhance the efficiency	Co-develop delivery standards like internet web shops that could be accompanied by delivery companies such as PostNL	Letting one company delivering all the groceries with the label of all the partners on the vehicles and clothes, assuring that benefits will be made per order for the grocery retailers and challenging the logistics service provider to achieve benefits from an efficient last mile delivery e.g. PostNL took over Sandd in order to make the postal delivery more efficient
16.	Use direct debit for paying	Connected payment options with PayPal or credit card to customer's supermarket profile that pays automatically and can be combined with customer stimulation to make use of this service by providing points if a card is added	As for all the web shops nowadays, only allow payment via Ideal with debit card, credit card or PayPal (Note: credit card must legally be offered as online payment methods to give customers the opportunity to pay in advance after having received the products. Also, costs of credit card are thus reduced)
17.	Reward people for being on time	Smart packages connected to apps that can send a reminder to bring bottles and crates to reimburse money when the deliverer almost reached the address. (Note: not using smart packages, but using	Send a message to customers on the moment they receive the estimated arrival time and one when deliverer is leaving the previous customer to have the bottles, crates or packages ready.

		customers' orders history to notice)	
18.	No delivery until kitchen	Options in app to let customers choose a preferred treatment by the deliverer e.g. talkative, assisted placement, customer helping with collecting the groceries or silent & drop (Note: addition to this solution is that customer must pay for extra service)	Sending a message when deliverer is leaving the previous customer with a standardized apology message and that he or she will hurry to deliver the groceries as soon as possible to the designated customer and the following customers.
19.	Better algorithm that can assure completeness of the grocery orders e.g. better ordering of the crates/boxes/plastic bags in the vehicles	Signing with a device where the groceries are for a certain customer	AR to help the deliverer to pick the groceries in the right order and will confirm if it is complete.
20.	Standardized training instead of personalized training from driver to driver	Screening employees by letting customers give a review on the deliverer	Using a rating system and opportunity to give tips to the deliverer, which will be evaluated by the team leaders and can lead to more standardized paid trainings in a classroom which is financed by the received tips.

#### 4. Rating alternatives to every success and failure factor

How likely will the alternatives help overcome the success and failure factors according to you and which alternative is the best (circle best option and explanation can be given below)?

The following Likert scale of likelihood can be used to rate:

1=Definitely not

2=Probably not

3=Possibly

4=Probably

5=Definitely

1. Best alternative to overcome this success or failure factor is:                      1                      2                      3

Customers prefer to do groceries in (mostly nearby) physical stores	1	2	3	4	5
1. Offering flexible subscriptions that can easily be terminated			X		
2. Use smart packaging that can track the volume of a certain product and give a signal to the grocery retailer that the product must be renewed		X			
3. AR to shop in a virtual store		X			

2. Best alternative to overcome this success or failure factor is:                      1                      2                      3

Customers don't like to do groceries in advance because they don't know what to eat	1	2	3	4	5
1. Offering same day delivery for people who don't know what to eat at locations where a lot of people work or come together				X	
2. Incentivize these people to shop online with promotions and loyalty points			X		
3. Help to make a week planner of what to eat and what groceries are needed for a certain number of people				X	

3. Best alternative to overcome this success or failure factor is:                      1                      2                      3

Customers want to feel fresh products or know the expiration date before buying it	1	2	3	4	5
1. Use social media to promote the freshness of the products			X		
2. Be sure to always send fresh products and show expiration date and any other information clearly, however if products are of less quality then less information should be provided					X
3. Show options of the freshness of the product that is preferred e.g. expiration date of milk between 1-2 days (35% discount) or 3-7 days.			X		

4. Best alternative to overcome this success or failure factor is: 1 2 3

<b>Customers buy less online due to more cost consciences if they buy online and less impulse buys and thus might not reach the minimum order price</b>	1	2	3	4	5
1. Offering discounts to products that are usually ordered together				X	
2. Show people an automatic trade-off system of having a certain minimum order price or paying certain delivery costs				X	
3. AR to shop in a virtual store to get inspired		X			

5. Best alternative to overcome this success or failure factor is: 1 2 3

<b>Customer is used to a certain brand</b>	1	2	3	4	5
1. Providing switching service for using other brands e.g. offering free products				X	
2. Compare all the products in the market with your product on the website				X	
3. Showing substitutes with information on the popularity of a certain product and the benefits				X	

6. Best alternative to overcome this success or failure factor is: 1 2 3

<b>Ideal time slots (day and time)</b>	1	2	3	4	5
1. To allow customers to pre-claim time slots				X	
2. Amazon boxes for 'not at home' delivery including cool boxes					X
3. Customers put on their profiles on what day of the week and moment of the day they are available for receiving grocery deliveries and based on this, the app will propose time slots				X	

7. Best alternative to overcome this success or failure factor is: 1 2 3

<b>Availability of preferred assortment or substitutes</b>	1	2	3	4	5
1. To bring substitutes to the doors if certain products are not available		X			
2. Automatic suitable presents and free products when products are unavailable				X	
3. Ask reason for having a product and then propose substitutes e.g. not having a "snack cucumber"; Customer giving the reason to have a healthy snack and then website or app propose "snack tomatoes" and "cucumber".					X

8. Best alternative to overcome this success or failure factor is: 1 2 3

<b>The lack of opportunity to add products last moment</b>	1	2	3	4	5
1. Pilot of a dynamic Uber/meal delivery-system with GPS, but then with groceries deliverers.			X		
2. One-click check out to add these products				X	
3. To every customer a set of personal preferred products will be proposed, and the opportunity is given to add products until an hour before a deliverer departs the hub or DC and then 2 times a day, a vehicle picks up these products from the most nearby store and bring it to the hub or DC.			X		

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9. Best alternative to overcome this success or failure factor is: 1 2 3

<b>Lack of recommendation of groceries that the customer might want</b>	1	2	3	4	5
1. Top 10 products directly in the bucket			x		
2. Ask people if they would like to buy certain products more often within an asked time span via the app				X	
3. At every tab of category of products, the discounted or most picked products by the customer are proposed				X	

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10. Best alternative to overcome this success or failure factor is: 1 2 3

<b>Lack of communication with customer and deliverer about arrival time</b>	1	2	3	4	5
1. More proactive communication with customer by calling or sending mails					X
2. Message to customer pop-ups 5 minutes before arrival				X	
3. Using a bus-concept of showing at which (anonymized) stop a deliverer is and how much delay every customer can expect given an exact arrival time					X

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11. Best alternative to overcome this success or failure factor is: 1 2 3

<b>Lack of data of (new) addresses</b>	1	2	3	4	5
1. Obtaining more data of the type of delivery locations e.g. high-rise or low-rise, during every delivery			X		
2. Use customer loyalty programs to gather data relevant for delivery in order to better plan next deliveries and allow drivers to write special circumstances on customer's profile				X	
3. At every address the deliverer must note what has been different or surprising by having Waze-app concept			X		

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12. Best alternative to overcome this success or failure factor is: 1 2 3

<b>No accurate routing time information</b>	1	2	3	4	5
1. Using reliable communication tools such as a good planner				X	
2. Have planning algorithms based on real-time data and historic data					X
3. Integrate the addresses in Google Maps to have the most efficient routes with real life circumstances					X

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13. Best alternative to overcome this success or failure factor is: 1 2 3

<b>Lack of experienced deliverers e.g. due to no reliable working hours</b>	1	2	3	4	5
1. Using same planning software as other companies in order to share a pole of deliverers			X		
2. A digital interface that provides a delivery checklist that guide delivery people				X	
3. Give promotions, add more responsibility to deliverers with a higher ranking and thus being able to offer more reliable hours					X

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14. Best alternative to overcome this success or failure factor is: 1 2 3

<b>High investments costs for electric vehicles and charging infrastructure and lock-in of current fleet of unsustainable vehicles that can carry more volume and have a larger range than electric vehicles</b>	1	2	3	4	5
1. Sustainable in other ways than using electric vehicles e.g. better return policy of batteries, clothes or old plastic			X		
2. Need to find vehicle re-use strategies for existing fleet (perhaps an app to rent these vehicles)			X		
3. Negotiation with government about subsidizes for the costs involved in replacing current fleet with electrical vehicles and making a long-term plan that can lead to pay back part of the subsidy if it has not been reached				x	

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15. Best alternative to overcome this success or failure factor is: 1 2 **3**

<b>Inefficient to consolidate deliveries of different grocery retailers due to extra handling costs</b>	1	2	3	4	5
1. Having at least 2 days between the ordering and delivering will enhance the efficiency			X		
2. Co-develop delivery standards like internet web shops that could be accompanied by delivery companies such as PostNL			X		
3. Letting one company delivering all the groceries with the label of all the partners on the vehicles and clothes, assuring that benefits will be made per order for the grocery retailers and challenging the logistics service provider to achieve benefits from an efficient last mile delivery e.g. PostNL took over Sandd in order to make the postal delivery more efficient				X	

16. Best alternative to overcome this success or failure factor is: 1 2 **3**

<b>Efficient payment system e.g. people still needs to get the payment cards, or the machine does not work</b>	1	2	3	4	5
1. Use direct debit for paying				X	
2. Connected payment options with PayPal or credit card to customer's supermarket profile that pays automatically and can be combined with customer stimulation to make use of this service by providing points if a card is added					X
3. As for all the web shops nowadays, only allow payment via Ideal with debit card, credit card or PayPal					X

17. Best alternative to overcome this success or failure factor is: 1 **2** **3**

<b>People still need to return bottles or crates</b>	1	2	3	4	5
1. Reward people for being on time		X			
2. Smart packages connected to apps that can send a reminder to bring bottles and crates to reimburse money when the deliverer almost reached the address.				X	
3. Send a message to customers on the moment they receive the estimated arrival time and one when deliverer is leaving the previous customer to have the bottles, crates or packages ready.					X

18. Best alternative to overcome this success or failure factor is:                    1                    2                    3

<b>Talkative customers during delivery until kitchen</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
1. No delivery until kitchen				X	
2. Options in app to let customers choose a preferred treatment by the deliverer e.g. talkative, assisted placement, customer helping with collecting the groceries or silent & drop			X		
3. Sending a message when deliverer is leaving the previous customer with a standardized apology message and that he or she will hurry to deliver the groceries as soon as possible to the designated customer and the following customers.			X		

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19. Best alternative to overcome this success or failure factor is:                    1                    2                    3

<b>Efficient way of finding groceries in the vehicle with no human mistakes</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
1. Better algorithm that can assure completeness of the grocery orders e.g. better ordering of the crates/boxes/plastic bags in the vehicles				X	
2. Signing with a device where the groceries are for a certain customer				X	
3. AR to help the deliverer to pick the groceries in the right order and will confirm if it is complete.				X	

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20. Best alternative to overcome this success or failure factor is:                    1                    2                    3

<b>Better trainings or evaluations for unsafe or impolite behaviors of drivers</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
1. Standardized training instead of personalized training from driver to driver				X	
2. Screening employees by letting customers give a review on the deliverer				X	
3. Using a rating system and opportunity to give tips to the deliverer, which will be evaluated by the team leaders and can lead to more standardized paid trainings in a classroom which is financed by the received tips.				X	

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## 5. Scoring best alternatives on stakeholders' objectives

In order to measure the effectiveness and acceptance of the best alternatives, every alternative will be scored on the stakeholders' objectives. Please fill in 1-5 in every box.

The following Likert scale of impact can be used to rate:

1= - - =very negative impact

2= - = negative impact

3= +/- = no/barely any impact

4= + = positive impact

5= + + = very positive impact

Objectives	Best alternatives																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1. Low costs for grocery retailers	3	3	3	4	4	5	4	3	3	4	4	5	2	5	5	5	4	5	4	2
2. Good image	4	4	5	3	4	4	3	3	3	4	3	4	4	5	2	3	3	2	3	3
3. High punctuality	3	3	4	3	3	5	3	3	3	4	4	5	4	3	3	4	4	5	4	4
4. High profitability	4	4	5	3	4	4	4	3	4	3	3	3	3	3	3	3	3	3	3	3
5. More customers	5	5	5	4	3	5	3	3	4	3	3	3	4	4	3	3	3	2	3	3
6. High rate of complete orders	3	3	3	3	4	3	4	3	3	3	3	3	3	3	3	3	3	3	4	4
7. Low costs for customers	4	4	3	3	3	4	3	3	3	3	3	3	3	3	3	3	3	3	3	3
8. Ease for customers	4	4	4	3	4	5	4	5	5	3	3	4	3	3	3	4	4	2	3	3
9. Low CO <sub>2</sub> emissions	3	3	3	3	3	4	3	3	3	3	4	4	3	5	4	3	3	3	3	3
10. Low noise for citizens	3	3	3	3	3	4	3	3	3	3	3	3	3	5	4	3	3	3	3	3
11. More comfort for deliverers	3	3	3	3	3	5	3	3	3	4	4	4	4	4	2	5	5	5	4	4

## **Interview 2**

### Stakeholder information:

- Stakeholder group: Customer perspectives represented by independent researcher
- Function: Lector cities and logistics
- Date of interview: 31-01-2020

### **1. Rating the importance of the identified key questions to enhance the viability of online grocery delivery in the Netherlands**

For every question, the following Likert scale can be used to rate:

1=Unimportant

2=Slightly important

3=Moderately important

4=Important

5=Very important

<b>Objectives</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
1. Low costs for grocery retailers					X
2. Good image				X	
3. High punctuality					X
4. High profitability				X	
5. More customers					X
6. High rate of complete orders					X
7. Low costs for customers					X
8. Ease for customers					X
9. Low CO <sub>2</sub> emissions	X				
10. Low noise for citizens	X				
11. More comfort for deliverers					X

Comments: there are barely CO<sub>2</sub> emissions in the last mile delivery of groceries, since a lot of vehicles are already sustainable. Besides, the citizens are already used of delivery services and the associated “noise”, which is not really experienced as noise anymore.

<b>Key questions</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
1. How do we build scale?					X
2. How do we keep the customers satisfied?					X
3. How can the (new) addresses be reached in an efficient and sustainable way?					X
4. How can the delivery at the customers' place be more efficient?					X

Comments: the regulatory aspect must also be taken into consideration e.g. laws for autonomous vehicles. Besides, the governments should also play a part in developing cities that is suitable for grocery deliveries.

## 2. Rating identified success and failure factors on level of importance for the viability of online grocery delivery in the Netherlands

**Questions 1-10** are factors related to achieve an efficient customer service to scale (1-5) and satisfy customers (6-10). **Questions 11-20** are factors related to achieve an efficient delivery by efficiently and sustainably reach the addresses (11-15) and by being more efficient at the place of the customer (16-20).

The following Likert scale of importance can be used:

1=Unimportant

2=Slightly important

3=Moderately important

4=Important

5=Very important

Success and failure factor	1	2	3	4	5
1. Customers prefer to do groceries in (mostly nearby) physical stores					X
2. Customers don't like to do groceries in advance because they don't know what to eat				X	
3. Customers want to feel fresh products or know the expiration date before buying it			X		
4. Customers buy less online due to more cost consciences if they buy online and less impulse buys and thus might not reach the minimum order price				X	
5. Customer is used of a certain brand			X		
6. Ideal time slots (day and time)					X
7. Availability of preferred assortment or substitutes				X	
8. The lack of opportunity to add products last moment		X			
9. Lack of recommendation of groceries that the customer might want		X			
10. Lack of communication with customer and deliverer about arrival time					X
11. Lack of data of (new) addresses				X	
12. No accurate routing time information				X	
13. Lack of experienced deliverers e.g. due to no reliable working hours					X
14. High investments costs for electric vehicles and charging infrastructure and lock-in of current fleet of unsustainable vehicles that can carry more volume and have a larger range than electric vehicles				X	
15. Inefficient to consolidate deliveries of different grocery retailers due to extra handling costs				X	
16. Efficient payment system e.g. people still needs to get the payment cards, or the machine does not work			X		
17. People still need to return bottles or crates				X	
18. Talkative customers during delivery until kitchen	X				
19. Efficient way of finding groceries in the vehicle with no human mistakes			X		
20. Better trainings or evaluations for unsafe or impolite behaviors of drivers					X

### 3. Alternatives for every success and failure factor

For every (20) success and failure factors, three alternatives are given that might help overcoming the success or failure factors and thus enhance the viability of online grocery shopping in the Netherlands. These alternatives are retrieved from 1. Interviews with stakeholders and experts 2. Outside in brainstorm session 3. Researcher. The preferred alternatives are green. High potential alternatives are orange and the preferred combined solutions are blue. Notes are given in red.

	Interviews with stakeholders and experts (10 were preferred)	Outside in brainstorm session (8 were preferred)	Researcher (2 were preferred)
1.	Offering flexible subscriptions that can easily be terminated (Note: researcher want to choose his own products, so subscriptions won't work)	Use smart packaging that can track the volume of a certain product and give a signal to the grocery retailer that the product must be renewed	AR to shop in a virtual store
2.	Offering same day delivery for people who don't know what to eat at locations where a lot of people work or come together	Incentivize these people to shop online with promotions and loyalty points	Help to make a week planner of what to eat and what groceries are needed for a certain number of people (Note: no data of customers anymore)
3.	Use social media to promote the freshness of the products	Be sure to always send fresh products and show expiration date and any other information clearly, however if products are of less quality then less information should be provided	Show options of the freshness of the product that is preferred e.g. expiration date of milk between 1-2 days (35% discount) or 3-7 days.
4.	Offering discounts to products that are usually ordered together (Note: recommendation of products that fit together is interesting, but not offering discounts)	Show people an automatic trade-off system of having a certain minimum order price or paying certain delivery costs	AR to shop in a virtual store to get inspired
5.	Providing switching service for using other brands e.g. offering free products	Compare all the products in the market with your product on the website	Showing substitutes with information on the popularity of a certain product and the benefits
6.	To allow customers to pre-claim time slots	Amazon boxes for 'not at home' delivery including cool boxes	Customers put on their profiles on what day of the week and moment of the day they are available for receiving grocery deliveries and based on this, the app will propose time slots

7.	To bring substitutes to the doors if certain products are not available (Note: Tesco has executed this well. However, the best way to deal with this problem is to deliver a complete order. This is just shifting the problem since the substitutes can also get sold out)	Automatic suitable presents and free products when products are unavailable	Ask reason for having a product and then propose substitutes e.g. not having a “snack cucumber”; Customer giving the reason to have a healthy snack and then website or app propose “snack tomatoes” and “cucumber”. (Note: less convenient for customers if too many recommendations are made)
8.	Pilot of a dynamic Uber/meal delivery-system with GPS, but then with groceries deliverers.	One-click check out to add these products (Note: send a message of “last chance to add a certain product to the shopping basket” to execute this)	To every customer a set of personal preferred products will be proposed, and the opportunity is given to add products until an hour before a deliverer departs the hub or DC and then 2 times a day, a vehicle picks up these products from the most nearby store and bring it to the hub or DC. (Note: too expensive)
9.	Top 10 products directly in the bucket	Ask people if they would like to buy certain products more often within an asked time span via the app	At every tab of category of products, the discounted or most picked products by the customer are proposed
10.	More proactive communication with customer by calling or sending mails (Note: some grocery retailers already send a lot of messages what can get annoying)	Message to customer pop-ups 5 minutes before arrival	Using a bus-concept of showing at which (anonymized) stop a deliverer is and how much delay every customer can expect given an exact arrival time (Note: researcher doesn't want to follow the deliverer)
11.	Obtaining more data of the type of delivery locations e.g. high-rise or low-rise, during every delivery	Use customer loyalty programs to gather data relevant for delivery in order to better plan next deliveries and allow drivers to write special circumstances on customer's profile	At every address the deliverer must note what has been different or surprising by having Waze-app concept
12.	Using reliable communication tools such as a good planner	Have planning algorithms based on real-time data and historic data	Integrate the addresses in Google Maps to have the most efficient routes with real life circumstances (Note: No cargo bike routes on Google maps. Besides, the

			deliverer spend more time at the customer than driving)
13.	Using same planning software as other companies in order to share a pole of deliverers	A digital interface that provides a delivery checklist that guide delivery people	Give promotions, add more responsibility to deliverers with a higher ranking and thus being able to offer more reliable hours
14.	Sustainable in other ways than using electric vehicles e.g. better return policy of batteries, clothes or old plastic	Need to find vehicle re-use strategies for existing fleet (perhaps an app to rent these vehicles)	Negotiation with government about subsidizes for the costs involved in replacing current fleet with electrical vehicles and making a long-term plan that can lead to pay back part of the subsidy if it has not been reached
15.	Having at least 2 days between the ordering and delivering will enhance the efficiency	Co-develop delivery standards like internet web shops that could be accompanied by delivery companies such as PostNL	Letting one company delivering all the groceries with the label of all the partners on the vehicles and clothes, assuring that benefits will be made per order for the grocery retailers and challenging the logistics service provider to achieve benefits from an efficient last mile delivery e.g. PostNL took over Sandd in order to make the postal delivery more efficient (Note: vehicles should only be delivering food related products)
16.	Use direct debit for paying (Note: new innovations in payments systems are coming e.g. with Account Information Services (AIS) and Payment Initiation Services (PIS) to allow the grocery retailer to take a direct debit from the customers' account)	Connected payment options with PayPal or credit card to customer's supermarket profile that pays automatically and can be combined with customer stimulation to make use of this service by providing points if a card is added	As for all the web shops nowadays, only allow payment via Ideal with debit card, credit card or PayPal
17.	Reward people for being on time	Smart packages connected to apps that can send a reminder to bring bottles and crates to reimburse money when the deliverer almost reached the address.	Send a message to customers on the moment they receive the estimated arrival time and one when deliverer is leaving the previous customer to have

			the bottles, crates or packages ready.
18.	No delivery until kitchen (Note: some customers do prefer this service. Thus, allow the customer to choose and pay for this extra service)	Options in app to let customers choose a preferred treatment by the deliverer e.g. talkative, assisted placement, customer helping with collecting the groceries or silent & drop	Sending a message when deliverer is leaving the previous customer with a standardized apology message and that he or she will hurry to deliver the groceries as soon as possible to the designated customer and the following customers.
19.	Better algorithm that can assure completeness of the grocery orders e.g. better ordering of the crates/boxes/plastic bags in the vehicles (Note: most of the grocery retailers already have a smart system for this. Thus, not a high score)	Signing with a device where the groceries are for a certain customer	AR to help the deliverer to pick the groceries in the right order and will confirm if it is complete.
20.	Standardized training instead of personalized training from driver to driver	Screening employees by letting customers give a review on the deliverer	Using a rating system and opportunity to give tips to the deliverer, which will be evaluated by the team leaders and can lead to more standardized paid trainings in a classroom which is financed by the received tips.

#### 4. Rating alternatives to every success and failure factor

How likely will the alternatives help overcome the success and failure factors according to you and which alternative is the best (circle best option and explanation can be given below)?

The following Likert scale of likelihood can be used to rate:

1=Definitely not

2=Probably not

3=Possibly

4=Probably

5=Definitely

1. Best alternative to overcome this success or failure factor is: 1 2 **3**

Customers prefer to do groceries in (mostly nearby) physical stores	1	2	3	4	5
1. Offering flexible subscriptions that can easily be terminated			x		
2. Use smart packaging that can track the volume of a certain product and give a signal to the grocery retailer that the product must be renewed	x				
3. AR to shop in a virtual store				x	

2. Best alternative to overcome this success or failure factor is: **1** 2 3

Customers don't like to do groceries in advance because they don't know what to eat	1	2	3	4	5
1. Offering same day delivery for people who don't know what to eat at locations where a lot of people work or come together					X
2. Incentivize these people to shop online with promotions and loyalty points				X	
3. Help to make a week planner of what to eat and what groceries are needed for a certain number of people	X				

3. Best alternative to overcome this success or failure factor is: 1 **2** 3

Customers want to feel fresh products or know the expiration date before buying it	1	2	3	4	5
1. Use social media to promote the freshness of the products	X				
2. Be sure to always send fresh products and show expiration date and any other information clearly, however if products are of less quality then less information should be provided					X
3. Show options of the freshness of the product that is preferred e.g. expiration date of milk between 1-2 days (35% discount) or 3-7 days.	X				

4. Best alternative to overcome this success or failure factor is: 1 2 3

<b>Customers buy less online due to more cost consciences if they buy online and less impulse buys and thus might not reach the minimum order price</b>	1	2	3	4	5
1. Offering discounts to products that are usually ordered together		X			
2. Show people an automatic trade-off system of having a certain minimum order price or paying certain delivery costs				X	
3. AR to shop in a virtual store to get inspired		X			

5. Best alternative to overcome this success or failure factor is: 1 2 3

<b>Customer is used to a certain brand</b>	1	2	3	4	5
1. Providing switching service for using other brands e.g. offering free products	X				
2. Compare all the products in the market with your product on the website				X	
3. Showing substitutes with information on the popularity of a certain product and the benefits					X

6. Best alternative to overcome this success or failure factor is: 1 2 3

<b>Ideal time slots (day and time)</b>	1	2	3	4	5
1. To allow customers to pre-claim time slots					X
2. Amazon boxes for 'not at home' delivery including cool boxes	X				
3. Customers put on their profiles on what day of the week and moment of the day they are available for receiving grocery deliveries and based on this, the app will propose time slots			X		

7. Best alternative to overcome this success or failure factor is: 1 2 3

<b>Availability of preferred assortment or substitutes</b>	1	2	3	4	5
1. To bring substitutes to the doors if certain products are not available					X
2. Automatic suitable presents and free products when products are unavailable				X	
3. Ask reason for having a product and then propose substitutes e.g. not having a "snack cucumber"; Customer giving the reason to have a healthy snack and then website or app propose "snack tomatoes" and "cucumber".	X				

8. Best alternative to overcome this success or failure factor is: 1 2 3

<b>The lack of opportunity to add products last moment</b>	1	2	3	4	5
1. Pilot of a dynamic Uber/meal delivery-system with GPS, but then with groceries deliverers.	X				
2. One-click check out to add these products					X
3. To every customer a set of personal preferred products will be proposed, and the opportunity is given to add products until an hour before a deliverer departs the hub or DC and then 2 times a day, a vehicle picks up these products from the most nearby store and bring it to the hub or DC.				X	

9. Best alternative to overcome this success or failure factor is: 1 2 3

<b>Lack of recommendation of groceries that the customer might want</b>	1	2	3	4	5
1. Top 10 products directly in the bucket					X
2. Ask people if they would like to buy certain products more often within an asked time span via the app			X		
3. At every tab of category of products, the discounted or most picked products by the customer are proposed				X	

10. Best alternative to overcome this success or failure factor is: 1 2 3

<b>Lack of communication with customer and deliverer about arrival time</b>	1	2	3	4	5
1. More proactive communication with customer by calling or sending mails	X				
2. Message to customer pop-ups 5 minutes before arrival					X
3. Using a bus-concept of showing at which (anonymized) stop a deliverer is and how much delay every customer can expect given an exact arrival time		X			

11. Best alternative to overcome this success or failure factor is: 1 2 3

<b>Lack of data of (new) addresses</b>	1	2	3	4	5
1. Obtaining more data of the type of delivery locations e.g. high-rise or low-rise, during every delivery					X
2. Use customer loyalty programs to gather data relevant for delivery in order to better plan next deliveries and allow drivers to write special circumstances on customer's profile				X	
3. At every address the deliverer must note what has been different or surprising by having Waze-app concept				X	

12. Best alternative to overcome this success or failure factor is: 1 2 3

<b>No accurate routing time information</b>	1	2	3	4	5
1. Using reliable communication tools such as a good planner				X	
2. Have planning algorithms based on real-time data and historic data					X
3. Integrate the addresses in Google Maps to have the most efficient routes with real life circumstances			X		

13. Best alternative to overcome this success or failure factor is: 1 2 3

<b>Lack of experienced deliverers e.g. due to no reliable working hours</b>	1	2	3	4	5
1. Using same planning software as other companies in order to share a pool of deliverers			X		
2. A digital interface that provides a delivery checklist that guide delivery people					X
3. Give promotions, add more responsibility to deliverers with a higher ranking and thus being able to offer more reliable hours				X	

14. Best alternative to overcome this success or failure factor is: 1 2 3

<b>High investments costs for electric vehicles and charging infrastructure and lock-in of current fleet of unsustainable vehicles that can carry more volume and have a larger range than electric vehicles</b>	1	2	3	4	5
1. Sustainable in other ways than using electric vehicles e.g. better return policy of batteries, clothes or old plastic				X	
2. Need to find vehicle re-use strategies for existing fleet (perhaps an app to rent these vehicles)			X		
3. Negotiation with government about subsidizes for the costs involved in replacing current fleet with electrical vehicles and making a long-term plan that can lead to pay back part of the subsidy if it has not been reached	X				

15. Best alternative to overcome this success or failure factor is: 1 2 3

<b>Inefficient to consolidate deliveries of different grocery retailers due to extra handling costs</b>	1	2	3	4	5
1. Having at least 2 days between the ordering and delivering will enhance the efficiency				X	
2. Co-develop delivery standards like internet web shops that could be accompanied by delivery companies such as PostNL	X				
3. Letting one company delivering all the groceries with the label of all the partners on the vehicles and clothes, assuring that benefits will be made per order for the grocery retailers and challenging the logistics service provider to achieve benefits from an efficient last mile delivery e.g. PostNL took over Sandd in order to make the postal delivery more efficient	X				

16. Best alternative to overcome this success or failure factor is:                    1                    2                    3

<b>Efficient payment system e.g. people still needs to get the payment cards, or the machine does not work</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
1. Use direct debit for paying					X
2. Connected payment options with PayPal or credit card to customer's supermarket profile that pays automatically and can be combined with customer stimulation to make use of this service by providing points if a card is added				X	
3. As for all the web shops nowadays, only allow payment via Ideal with debit card, credit card or PayPal			X		

17. Best alternative to overcome this success or failure factor is:                    1                    2                    3

<b>People still need to return bottles or crates</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
1. Reward people for being on time				X	
2. Smart packages connected to apps that can send a reminder to bring bottles and crates to reimburse money when the deliverer almost reached the address.					X
3. Send a message to customers on the moment they receive the estimated arrival time and one when deliverer is leaving the previous customer to have the bottles, crates or packages ready.				X	

18. Best alternative to overcome this success or failure factor is:                    1                    2                    3

<b>Talkative customers during delivery until kitchen</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
1. No delivery until kitchen			X		
2. Options in app to let customers choose a preferred treatment by the deliverer e.g. talkative, assisted placement, customer helping with collecting the groceries or silent & drop				X	
3. Sending a message when deliverer is leaving the previous customer with a standardized apology message and that he or she will hurry to deliver the groceries as soon as possible to the designated customer and the following customers.	X				

19. Best alternative to overcome this success or failure factor is:                    1                    2                    3

<b>Efficient way of finding groceries in the vehicle with no human mistakes</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
1. Better algorithm that can assure completeness of the grocery orders e.g. better ordering of the crates/boxes/plastic bags in the vehicles				X	
2. Signing with a device where the groceries are for a certain customer			X		
3. AR to help the deliverer to pick the groceries in the right order and will confirm if it is complete.			X		

20. Best alternative to overcome this success or failure factor is:      1      2      3

<b>Better trainings or evaluations for unsafe or impolite behaviors of drivers</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
1. Standardized training instead of personalized training from driver to driver					X
2. Screening employees by letting customers give a review on the deliverer				X	
3. Using a rating system and opportunity to give tips to the deliverer, which will be evaluated by the team leaders and can lead to more standardized paid trainings in a classroom which is financed by the received tips.				X	

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## 5. Scoring best alternatives on stakeholders' objectives

In order to measure the effectiveness and acceptance of the best alternatives, every alternative will be scored on the stakeholders' objectives. Please fill in 1-5 in every box.

The following Likert scale of likelihood can be used to rate:

1= - - =very negative impact

2= - = negative impact

3= +/- = no/barely any impact

4= + = positive impact

5= + + = Very positive impact

Objectives	Best alternatives																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1. Low costs for grocery retailers	3	3	3	3	3	3	5	2	3	3	3	4	3	4	2	3	3	3	3	3
2. Good image	3	4	3	4	5	3	3	3	4	4	3	4	3	3	2	3	3	4	3	3
3. High punctuality	3	3	3	3	3	3	4	3	3	4	4	5	4	3	2	3	4	3	3	3
4. High profitability	4	4	3	4	4	3	4	4	4	3	3	3	3	4	2	3	5	3	3	3
5. More customers	4	4	3	4	4	3	3	3	3	3	3	3	3	3	2	3	3	3	3	3
6. High rate of complete orders	3	3	3	3	3	3	3	2	5	3	3	3	3	3	3	3	3	3	3	3
7. Low costs for customers	3	3	3	3	3	3	3	2	4	3	3	3	3	3	3	3	3	3	3	3
8. Ease for customers	4	5	3	3	3	3	3	4	4	5	3	3	3	3	2	2	4	4	3	3
9. Low CO <sub>2</sub> emissions	3	3	3	3	3	3	4	3	3	3	3	3	3	5	4	3	3	3	3	3
10. Low noise for citizens	3	3	3	3	3	3	3	3	3	3	3	3	3	4	3	3	3	3	3	3
11. More comfort for deliverers	3	3	3	3	3	3	4	3	3	3	4	4	2	3	2	3	5	3	4	2

## Appendix L: Eliciting and scoring alternatives to enhance the viability of online grocery shopping in the Netherlands

As elaborated in section 3.2, stakeholders and experts were asked to come up with alternatives for reaching a certain objective after having determined the associated success and failure factors. These results are discussed, and a selection is made of the best alternatives. Besides, the results of the brainstorm session with Accenture consultants and interns are also discussed. Furthermore, the alternatives proposed by the researcher are elaborated based on empirical research and secondary resources. Each chapter starts with the elaboration on how to find the alternatives, followed by an analysis of the alternatives based on the scores and preferences assigned by an independent researcher and a bricks-and-clicks company. From these scores, it can be seen to what extent the most preferred alternative is likely to overcome the success and failure factors. However, the results are not representative, since only two stakeholders have scored them.

### **Alternatives elicited from interviews with stakeholders and experts**

During the same interviews with stakeholders and experts as for eliciting the objectives and success and failure factors (chapter 5), the stakeholders and experts were asked to propose alternatives for achieving certain objectives given the identified success and failure factors (See appendix D). These alternatives were not directly proposed to the success and failure factors in chapter 5, since no list of success and failure factors was conducted before the interviews and to arrange new interviews with all the stakeholders and experts would have been too time consuming. Therefore, the elicited initial list of alternatives was first clustered per success and failure factor in table 16. This was done by finding the right keywords, and the possibility that this alternative can help overcome a certain success or failure factor. An example is given:

#### **Example 1.**

*The alternative “Use social media to promote the freshness of the products” was identified to enhance the fresh image of a pure player, but is categorized under the factor “Customers want to feel fresh products or know the expiration date before buying it” due to the similar keyword “fresh” and since it might convince people by showing that the products that will be delivered are fresh.*

The complete list of almost 70 initial alternatives is presented in appendix G. From this list, the best solution per success and failure factor are chosen. For this, a selection procedure should be followed except if a certain success and failure factors only have one alternative proposed. This procedure is based on 1. How concrete a solution is, and 2. How likely a solution can help to overcome a certain success or failure factor. Some alternatives are also combined if that enhance the solution. An example is given:

#### **Example 2.**

*For the second factor “2. Customers don’t like to do groceries in advance because they don’t know what to eat” the following alternatives were proposed:*

*2.1 More accurate volumes offered when ordering products from recipes for a certain number of persons*

*2.2 Offering same day delivery for people who don’t know what to eat*

2.3 Same day delivery at locations where a lot of people work or come together

2.4 Large billboard with inspiration of food

Alternatives 2.2 and 2.3 are both about same day delivery. Therefore, these alternatives can easily fit in each other into “Offering same day delivery for people who don’t know what to eat at locations where a lot of people work or come together”. This is a very concrete solution and compared to the first and fourth solution, the most likely to overcome this factor since the first alternative only focus on the assortment and the third only at a certain area where a billboard is.

This method of categorizing solutions and selecting the best solutions is based on the subjectivity of the researcher. Therefore, the alternatives are validated by letting an independent researcher and a bricks-and-clicks retailer score on how likely an alternative can overcome a success and failure factor based on a 5-point Likert Scale (1=Definitely not, 2=Probably not, 3=Possibly, 4=Probably and 5=Definitely), since this is the most important criterion. The complete list of alternatives elicited from these interviews and the scores are presented in table 34. The preferred alternative by the independent researcher or bricks-and-clicks company are yellow.

**Table 34.** Final list of solutions elicited from interviews with stakeholders and experts

Success and failure factor	Solutions elicited from interviews	One CPIR	One GR	Average
<b>Customers prefer to do groceries in (mostly nearby) physical stores</b>	Offering flexible subscriptions that can easily be terminated	3	3	3
<b>Customers don’t like to do groceries in advance because they don’t know what to eat</b>	Offering same day delivery for people who don’t know what to eat at locations where a lot of people work or come together	5	4	4.5
<b>Customers want to feel fresh products or know the expiration date before buying it</b>	Use social media to promote the freshness of the products	1	3	2
<b>Customers buy less online due to more cost consciences if they buy online and less impulse buys and thus might not reach the minimum order price</b>	Offering discounts to products that are usually ordered together	2	4	3
<b>Customer is used of a certain brand</b>	Providing switching service for using other brands e.g. offering free products	1	4	2.5
<b>Ideal time slots (day and time)</b>	To allow customers to pre-claim time slots	5	4	4.5
<b>Availability of preferred assortment or substitutes</b>	To bring substitutes to the doors if certain products are not available	5	2	3.5
<b>The lack of opportunity to add products last moment</b>	Pilot of a dynamic Uber/meal delivery-system with GPS, but then with groceries deliverers.	1	3	2

<b>Lack of recommendation of groceries that the customer might want</b>	Top 10 products directly in the bucket	5	3	4
<b>Lack of communication with customer and deliverer about arrival time</b>	More proactive communication with customer by calling or sending mails	1	5	3
<b>Lack of data of (new) addresses</b>	Obtaining more data of the type of delivery locations e.g. high-rise or low-rise, during every delivery	4	3	3.5
<b>No accurate routing time information</b>	Using reliable communication tools such as a good planner	4	4	4
<b>Lack of experienced deliverers e.g. due to no reliable working hours</b>	Using same planning software as other companies in order to share a pole of deliverers	3	3	3
<b>High investments costs for electric vehicles and charging infrastructure and lock-in of current fleet of unsustainable vehicles that can carry more volume and have a larger range than electric vehicles</b>	Sustainable in other ways than using electric vehicles e.g. better return policy of batteries, clothes or old plastic	4	3	3
<b>Inefficient to consolidate deliveries of different grocery retailers due to extra handling costs</b>	Having at least 2 days between the ordering and delivering will enhance the efficiency	4	3	3.5
<b>Efficient payment system e.g. people still needs to get the payment cards, or the machine does not work</b>	Use direct debit for paying	5	4	4.5
<b>People still need to return bottles or crates</b>	Reward people for being on time	4	2	3
<b>Talkative customers during delivery until kitchen</b>	No delivery until kitchen	3	4	3.5
<b>Efficient way of finding groceries in the vehicle with no human mistakes</b>	Better algorithm that can assure completeness of the grocery orders e.g. better ordering of the crates/boxes/plastic bags in the vehicles	4	4	4
<b>Better trainings or evaluations for unsafe or impolite behaviors of drivers</b>	Standardized training instead of personalized training from driver to driver	5	4	4.5

Out of the list of alternatives presented in table 34, no alternative was preferred by both the independent researcher with customer perspectives and the bricks-and-clicks company. However, the alternative “More proactive communication with customer by calling or sending mails” will overcome the lack of communication with customer and deliverer according to the bricks-and-clicks company, but definitely not according to the independent researcher. This is explained by the independent researcher that some grocery retailers are already very proactive in sending mails and messages, that it might get annoying if it will become more proactive. Thus, a proactive communication is good, only

to a certain level. Besides, the independent researcher thinks that bringing substitutes to the door if certain products are not available is a good solution to ensure availability of preferred products or substitutes. However, the bricks-and-clicks grocery retailer thinks that it is probably not likely to solve this problem, probably because of the lack of stock of the substitutes which leads to a shift of the problem. After communication with both parties it is determined that the best way to overcome this success or failure factor is just to always deliver complete orders by making good predictions and good agreements with suppliers. Remarkably, "Using reliable communication tools such as a good planner" is scored with a "4" by both interviewees but is not a preferred option. Therefore, it is not evaluated.

There are only four alternatives that will definitely overcome a certain success or failure factor (score of "5") that is also supported by the other interviewee with a score of at least "4", namely:

- Offering same day delivery for people who don't know what to eat at locations where a lot of people work or come together
- To allow customers to pre-claim time slots
- Use direct debit for paying
- Standardized training instead of personalized training from driver to driver

The alternatives that are preferred by either one of the interviewees, but will only probably or possibly (average score between 3 and 4) overcome a certain success or failure factor are:

- Better algorithm that can assure completeness of the grocery orders e.g. better ordering of the crates/boxes/plastic bags in the vehicles
- No delivery until kitchen
- Having at least 2 days between the ordering and delivering will enhance the efficiency
- Sustainable in other ways than using electric vehicles e.g. better return policy of batteries, clothes or old plastic
- Obtaining more data of the type of delivery locations e.g. high-rise or low-rise, during every delivery
- Offering flexible subscriptions that can easily be terminated
- Top 10 products directly in the bucket

### **Alternatives elicited from brainstorm session with Accenture consultants and interns**

This brainstorm session was held in order to get an outside in point of view on this topic. As opposed to the alternatives from the interviews, these alternatives were proposed to overcome the success and failure factors. For this, a document was provided to the participants with the success and failure factors. Also, a document with initial alternatives from the interviews was provided in order to give the participants a certain direction. However, this document was not used. First, the success and failure factors were explained in detail so that no bias could exist. After that, 3 Accenture consultants and 3 Accenture interns were randomly assigned a key question from which they had to come up with alternatives to solve the five success and failure factors that belonged to that key question. Since key question 3 and 4 are directly related to the last mile delivery, two participants focused on each of these questions. After several minutes, the documents were swapped 2 times, whereas comments and additional alternatives were given by other participants. Ideally, every participant should have had come up with 3 alternatives per success and failure factor. However, due to time constraint, this was not possible. This has led to some success and failure factors with only one alternative.

For this initial list of alternatives, a set of alternatives for every success or failure factor must be selected. Besides the two selection criteria for eliciting alternatives from the interviews, these alternatives are also selected on innovative and technology driven solutions, since it is elicited from a creative brainstorm session within Accenture. Therefore, the following three selection criteria are used: 1. How concrete a solution is 2. How likely a solution can help to overcome a certain success or failure factor 3. How innovative and tech-driven a solution is. An example is:

**Example 3.**

*For the second factor “3. Customers want to feel fresh products or know the expiration date before buying it” the following alternatives were proposed:*

3.1 Be sure to always send fresh products and show expiration date and any other information clearly, however if products are of less quality then less information should be provided

3.2 This is also not always possible in stores. Thus, have a freshness ensures policy for online orders.

*Alternatives 3.1 is more focusing on gathering the right data and knowing how to provide the right information. This is more a technology-driven solution than having a policy that ensures freshness. Besides, the latter is vaguer and is already in use by Jumbo, Albert Heijn and Picnic that take back bad products. Therefore, the first solution is proposed.*

The list of alternatives used from this brainstorm session is presented in table 35. This selection procedure was also based on the subjectivity of the researcher. Therefore, also these alternatives are validated by letting an independent researcher and a bricks-and-clicks retailer score on how likely an alternative can overcome a success and failure factor based on a 5-point Likert Scale (1=Definitely not, 2=Probably not, 3=Possibly, 4=Probably and 5=Definitely).

**Table 35.** Final list of solutions elicited from brainstorm session with Accenture consultants and interns

Success and failure factor	Outside in brainstorm session	One CPIR	One GR	Average
<b>Customers prefer to do groceries in (mostly nearby) physical stores</b>	Use smart packaging that can track the volume of a certain product and give a signal to the grocery retailer that the product must be renewed	1	2	1.5
<b>Customers don't like to do groceries in advance because they don't know what to eat</b>	Incentivize these people to shop online with promotions and loyalty points	4	3	3.5
<b>Customers want to feel fresh products or know the expiration date before buying it</b>	Be sure to always send fresh products and show expiration date and any other information clearly, however if products are of less quality then less information should be provided	5	5	5
<b>Customers buy less online due to more cost consciences if they buy online and less impulse buys and</b>	Show people an automatic trade-off system of having a certain minimum	4	4	4

<b>thus might not reach the minimum order price</b>	order price or paying certain delivery costs			
<b>Customer is used of a certain brand</b>	Compare all the products in the market with your product on the website	4	4	4
<b>Ideal time slots (day and time)</b>	Amazon boxes for 'not at home' delivery including cool boxes	1	5	3
<b>Availability of preferred assortment or substitutes</b>	Automatic suitable presents and free products when products are unavailable	4	4	4
<b>The lack of opportunity to add products last moment</b>	One-click check out to add these products	5	4	4.5
<b>Lack of recommendation of groceries that the customer might want</b>	Ask people if they would like to buy certain products more often within an asked time span via the app	3	4	3.5
<b>Lack of communication with customer and deliverer about arrival time</b>	Message to customer pop-ups 5 minutes before arrival	5	4	4.5
<b>Lack of data of (new) addresses</b>	Use customer loyalty programs to gather data relevant for delivery in order to better plan next deliveries and allow drivers to write special circumstances on customer's profile	4	4	4
<b>No accurate routing time information</b>	Have planning algorithms based on real-time data and historic data	5	5	5
<b>Lack of experienced deliverers e.g. due to no reliable working hours</b>	A digital interface that provides a delivery checklist that guide delivery people	5	4	4.5
<b>High investments costs for electric vehicles and charging infrastructure and lock-in of current fleet of unsustainable vehicles that can carry more volume and have a larger range than electric vehicles</b>	Need to find vehicle re-use strategies for existing fleet (perhaps an app to rent these vehicles)	3	3	3
<b>Inefficient to consolidate deliveries of different grocery retailers due to extra handling costs</b>	Co-develop delivery standards like internet web shops that could be accompanied by delivery companies such as PostNL	1	3	2
<b>Efficient payment system e.g. people still needs to get the payment cards, or the machine does not work</b>	Connected payment options with PayPal or credit card to customer's supermarket profile that pays automatically and can be combined with customer stimulation to make use of this service by providing points if a card is added	4	5	4.5
<b>People still need to return bottles or crates</b>	Smart packages connected to apps that can send a reminder to bring	5	4	4.5

	bottles and crates to reimburse money when the deliverer almost reached the address.			
<b>Talkative customers during delivery until kitchen</b>	Options in app to let customers choose a preferred treatment by the deliverer e.g. talkative, assisted placement, customer helping with collecting the groceries or silent & drop	4	3	3.5
<b>Efficient way of finding groceries in the vehicle with no human mistakes</b>	Signing with a device where the groceries are for a certain customer	3	4	3.5
<b>Better trainings or evaluations for unsafe or impolite behaviors of drivers</b>	Screening employees by letting customers give a review on the deliverer	4	4	4

There are five alternatives that are considered as the best alternatives to overcome a certain success or failure factor according to both an independent researcher and a bricks-and-clicks company. However, only four have a score of five assigned, which means that this will definitely overcome a certain success or failure factor, namely:

- Be sure to always send fresh products and show expiration date and any other information clearly, however if products are of less quality then less information should be provided
- One-click check out to add these products
- Have planning algorithms based on real-time data and historic data
- Smart packages connected to apps that can send a reminder to bring bottles and crates to reimburse money when the deliverer almost reached the address.

A solution that is scored with a “5” and a “1” is “the Amazon boxes for ‘not at home’ delivery including cool boxes”. This alternative will definitely not solve the problem of an ideal time slot, since customers want the groceries to be delivered to their houses. Otherwise, they could have made use of the pick-up services that both Albert Heijn and Jumbo provide. However, it will definitely help smaller grocery retailers that do not have many stores near customers. Remarkably, the alternatives “Automatic suitable presents and free products when products are unavailable”, “Connected payment options with PayPal or credit card to customer’s supermarket profile that pays automatically and can be combined with customer stimulation to make use of this service by providing points if a card is added”, “Compare all the products in the market with your product on the website” and “Screening employees by letting customers give a review on the deliverer” have an average score of 4 or 4.5, but are not preferred. This is explained due to other options that are similar or better. However, this does mean that these alternatives have high potential to overcome the success and failure factors as well.

Two other solutions that will also definitely overcome the success or failure factor and has the support of the other interviewee with a score of 4 are:

- Message to customer pop-ups 5 minutes before arrival
- A digital interface that provides a delivery checklist that guide delivery people

The alternatives that are preferred by either one of the interviewees, but will only probably or possibly (average score between 3 and 4) overcome a certain success or failure factor are:

- Options in app to let customers choose a preferred treatment by the deliverer e.g. talkative, assisted placement, customer helping with collecting the groceries or silent & drop
- Use customer loyalty programs to gather data relevant for delivery in order to better plan next deliveries and allow drivers to write special circumstances on customer's profile
- Show people an automatic trade-off system of having a certain minimum order price or paying certain delivery costs

### Alternatives elicited from the perspective of the researcher based on empirical research, interviews and secondary research

The last set of alternatives are based on the knowledge of the researcher, who has performed desk research, empirical research and has conducted interviews with 16 stakeholders/experts. This allows to have another set of alternatives that is designed for every success or failure factor. Besides, also these alternatives will be validated by letting an independent researcher and a bricks-and-clicks retailer score on how likely an alternative can overcome a success and failure factor based on a 5-point Likert Scale (1=Definitely not, 2=Probably not, 3=Possibly, 4=Probably and 5=Definitely). These solutions and results are presented in table 36.

**Table 36.** Final list of solutions proposed by the researcher

Success and failure factor	Researcher	One CPIR	One GR	Average
<b>Customers prefer to do groceries in (mostly nearby) physical stores</b>	AR to shop in a virtual store	4	2	3
<b>Customers don't like to do groceries in advance because they don't know what to eat</b>	Help to make a week planner of what to eat and what groceries are needed for a certain number of people	1	4	2.5
<b>Customers want to feel fresh products or know the expiration date before buying it</b>	Show options of the freshness of the product that is preferred e.g. expiration date of milk between 1-2 days (35% discount) or 3-7 days.	1	3	2
<b>Customers buy less online due to more cost consciences if they buy online and less impulse buys and thus might not reach the minimum order price</b>	AR to shop in a virtual store to get inspired	2	2	2
<b>Customer is used of a certain brand</b>	Showing substitutes with information on the popularity of a certain product and the benefits	5	4	4.5
<b>Ideal time slots (day and time)</b>	Customers put on their profiles on what day of the week and moment of the day they are available for receiving grocery deliveries and based on this, the app will propose time slots	3	4	3.5
<b>Availability of preferred assortment or substitutes</b>	Ask reason for having a product and then propose substitutes e.g. not having a "snack cucumber"; Customer giving the reason to have a healthy snack and then website or app propose "snack tomatoes" and "cucumber".	1	5	3

<b>The lack of opportunity to add products last moment</b>	To every customer a set of personal preferred products will be proposed, and the opportunity is given to add products until an hour before a deliverer departs the hub or DC and then 2 times a day, a vehicle picks up these products from the most nearby store and bring it to the hub or DC.	4	3	3.5
<b>Lack of recommendation of groceries that the customer might want</b>	At every tab of category of products, the discounted or most picked products by the customer are proposed	4	4	3.5
<b>Lack of communication with customer and deliverer about arrival time</b>	Using a bus-concept of showing at which (anonymized) stop a deliverer is and how much delay every customer can expect given an exact arrival time	2	5	3.5
<b>Lack of data of (new) addresses</b>	At every address the deliverer must note what has been different or surprising by having Waze-app concept	4	3	3.5
<b>No accurate routing time information</b>	Integrate the addresses in Google Maps to have the most efficient routes with real life circumstances	3	5	4
<b>Lack of experienced deliverers e.g. due to no reliable working hours</b>	Give promotions, add more responsibility to deliverers with a higher ranking and thus being able to offer more reliable hours	4	5	4.5
<b>High investments costs for electric vehicles and charging infrastructure and lock-in of current fleet of unsustainable vehicles that can carry more volume and have a larger range than electric vehicles</b>	Negotiation with government about subsidizes for the costs involved in replacing current fleet with electrical vehicles and making a long-term plan that can lead to pay back part of the subsidy if it has not been reached	1	4	2.5
<b>Inefficient to consolidate deliveries of different grocery retailers due to extra handling costs</b>	Letting one company delivering all the groceries with the label of all the partners on the vehicles and clothes, assuring that benefits will be made per order for the grocery retailers and challenging the logistics service provider to achieve benefits from an efficient last mile delivery e.g. PostNL took over Sandd in order to make the postal delivery more efficient	1	4	2.5
<b>Efficient payment system e.g. people still needs to get the payment cards, or the machine does not work</b>	As for all the web shops nowadays, only allow payment via Ideal with debit card, credit card or PayPal	3	5	4

<b>People still need to return bottles or crates</b>	Send a message to customers on the moment they receive the estimated arrival time and one when deliverer is leaving the previous customer to have the bottles, crates or packages ready.	4	5	4.5
<b>Talkative customers during delivery until kitchen</b>	Sending a message when deliverer is leaving the previous customer with a standardized apology message and that he or she will hurry to deliver the groceries as soon as possible to the designated customer and the following customers.	1	3	2
<b>Efficient way of finding groceries in the vehicle with no human mistakes</b>	AR to help the deliverer to pick the groceries in the right order and will confirm if it is complete.	3	4	3.5
<b>Better trainings or evaluations for unsafe or impolite behaviors of drivers</b>	Using a rating system and opportunity to give tips to the deliverer, which will be evaluated by the team leaders and can lead to more standardized paid trainings in a classroom which is financed by the received tips.	4	4	4

In table 36, only one alternative is preferred by both the interviewees, which is “Showing substitutes with information on the popularity of a certain product and the benefits”. Besides, the following two alternatives will also definitely help overcoming the associated success or failure factor and is supported by the opinion of the other interviewee with a score of “4”:

- Give promotions, add more responsibility to deliverers with a higher ranking and thus being able to offer more reliable hours
- Send a message to customers on the moment they receive the estimated arrival time and one when deliverer is leaving the previous customer to have the bottles, crates or packages ready

Besides these good solutions, there are several solutions that are only scored above 3 and chosen, which means that these solutions probably, possibly or definitely overcome the success and failure factor. These are:

- Using a rating system and opportunity to give tips to the deliverer, which will be evaluated by the team leaders and can lead to more standardized paid trainings in a classroom which is financed by the received tips
- AR to help the deliverer to pick the groceries in the right order and will confirm if it is complete
- As for all the web shops nowadays, only allow payment via Ideal with debit card, credit card or PayPal
- Integrate the addresses in Google Maps to have the most efficient routes with real life circumstances
- At every tab of category of products, the discounted or most picked products by the customer are proposed

What is very remarkable, is that there are 5 alternatives that are preferred by one of the interviewees but are scored below 3 by the other interviewee. For these alternatives, comments were asked by the

concerned interviewee. The first alternative “AR to shop in a virtual store” is perceived as a probably good solution by the independent researcher to change people grocery shopping habit from physical store to online. The bricks-and-clicks company do think this is a good solution but knows that this will need a lot of investment which makes it not feasible in the short term. The alternative “Help to make a week planner of what to eat and what groceries are needed for a certain number of people” is associated with the meal box concepts. Both Albert Heijn and Picnic are doing this. The independent researcher does not think that this will help overcome this problem since the market of meal boxes is shrinking (Meesterburrie, 2019). Besides, the alternative “Ask reason for having a product and then propose substitutes e.g. not having a “snack cucumber”; Customer giving the reason to have a healthy snack and then website or app propose “snack tomatoes” and “cucumber”” is not considered a good solution according to the independent researcher, since it is important to just have all the products available that the customer wants. The solution “Negotiation with government about subsidizes for the costs involved in replacing current fleet with electrical vehicles and making a long-term plan that can lead to pay back part of the subsidy if it has not been reached” is also not a good solution, since the government will probably not pay for this. Besides, the costs are not that much higher compared to conventional vehicles anymore. Furthermore, the alternative “Letting one company delivering all the groceries with the label of all the partners on the vehicles and clothes, assuring that benefits will be made per order for the grocery retailers and challenging the logistics service provider to achieve benefits from an efficient last mile delivery e.g. PostNL took over Sandd in order to make the postal delivery more efficient” will not work, since it will be very difficult to combine all the groceries of different parties. Especially, if it must also be combined with other deliveries than groceries. Lastly, the alternative “Using a bus-concept of showing at which (anonymized) stop a deliverer is and how much delay every customer can expect given an exact arrival time” is not preferred by any of the interviewees but is scored with a “5” by the bricks-and-clicks company. The independent researcher does not think this will enhance the communication, since some people do not want to follow the route.

## Appendix M. Scored alternatives on the stakeholders' objectives weights

### 1. How can we build scale?

Weighted sum scores with the weights assigned by the independent researcher:

Objectives	Alternatives					
	Weights	Offering flexible subscriptions that can easily be terminated	Offering same day delivery for people who don't know what to eat at locations where a lot of people work or come together	Be sure to always send fresh products and show expiration date and any other information clearly, however if products are of less quality then less information should be provided	Show people an automatic trade-off system of having a certain minimum order price or paying certain delivery costs	Showing substitutes with information on the popularity of a certain product and the benefits
Low costs for grocery retailers	5	0	0	0	0.5	0.5
Good image	4	1	1	1	0.5	1.5
High punctuality	5	0	0	0.5	0	0
High profitability	4	1	1	1	0.5	1
More customers	5	2	1	1	1	0.5
High rate of complete orders	5	0	0	0	0	0.5
Low costs for customers	5	1	0	0	0	0
Ease for customers	5	1	2	0.5	0	0.5
Low CO <sub>2</sub> emissions	1	0	0	0	0	0
Low noise for citizens	1	0	0	0	0	0
More comfort for deliverers	5	0	0	0	0	0
<b>Weighted sum score</b>		28	23	18	11.5	20

Weighted sum scores with the weights assigned by the bricks-and-clicks grocery retailer:

Objectives	Alternatives					
	Weights	Offering flexible subscriptions that can easily be terminated	Offering same day delivery for people who don't know what to eat at locations where a lot of people work or come together	Be sure to always send fresh products and show expiration date and any other information clearly, however if products are of less quality then less information should be provided	Show people an automatic trade-off system of having a certain minimum order price or paying certain delivery costs	Showing substitutes with information on the popularity of a certain product and the benefits
Low costs for grocery retailers	5	0	0	0	0.5	0.5
Good image	5	1	1	1	0.5	1.5
High punctuality	5	0	0	0.5	0	0
High profitability	5	1	1	1	0.5	1
More customers	5	2	1	1	1	0.5
High rate of complete orders	5	0	0	0	0	0.5
Low costs for customers	4	1	0	0	0	0
Ease for customers	4	1	2	0.5	0	0.5
Low CO <sub>2</sub> emissions	4	0	0	0	0	0
Low noise for citizens	4	0	0	0	0	0
More comfort for deliverers	4	0	0	0	0	0
<b>Weighted sum score</b>		28	23	19.5	12.5	22

Weighted sum scores with the weights all on very important (score of 5):

Objectives	Alternatives					
	Weights	Offering flexible subscriptions that can easily be terminated	Offering same day delivery for people who don't know what to eat at locations where a lot of people work or come together	Be sure to always send fresh products and show expiration date and any other information clearly, however if products are of less quality then less information should be provided	Show people an automatic trade-off system of having a certain minimum order price or paying certain delivery costs	Showing substitutes with information on the popularity of a certain product and the benefits
Low costs for grocery retailers	5	0	0	0	0.5	0.5
Good image	5	1	1	1	0.5	1.5
High punctuality	5	0	0	0.5	0	0
High profitability	5	1	1	1	0.5	1
More customers	5	2	1	1	1	0.5
High rate of complete orders	5	0	0	0	0	0.5
Low costs for customers	5	1	0	0	0	0
Ease for customers	5	1	2	0.5	0	0.5
Low CO <sub>2</sub> emissions	5	0	0	0	0	0
Low noise for citizens	5	0	0	0	0	0
More comfort for deliverers	5	0	0	0	0	0
<b>Weighted sum score</b>		30	25	20	12.5	22.5

## 2. How do we keep the customers satisfied?

Weighted sum scores with the weights assigned by the independent researcher:

Objectives	Alternatives					
	Weights	Amazon boxes for 'not at home' delivery including cool boxes	To bring substitutes to the doors if certain products are not available	One-click check out to add these products	At every tab of category of products, the discounted or most picked products by the customer are proposed	Message to customer pop-ups 5 minutes before arrival
Low costs for grocery retailers	5	2	2	-0.5	0	0
Good image	4	1	0	0	0	1
High punctuality	5	2	1	0	0	1
High profitability	4	1	1	0.5	1	0
More customers	5	2	0	0	1	0
High rate of complete orders	5	0	0	-0.5	0	0
Low costs for customers	5	1	0	-0.5	0	0
Ease for customers	5	2	0	1.5	2	2
Low CO <sub>2</sub> emissions	1	1	1	0	0	0
Low noise for citizens	1	1	0	0	0	0
More comfort for deliverers	5	2	1	0	0	1
<b>Weighted sum score</b>		65	25	2	19	24

Weighted sum scores with the weights assigned by the bricks-and-clicks grocery retailer:

Objectives	Alternatives					
	Weights	Amazon boxes for 'not at home' delivery including cool boxes	To bring substitutes to the doors if certain products are not available	One-click check out to add these products	At every tab of category of products, the discounted or most picked products by the customer are proposed	Message to customer pop-ups 5 minutes before arrival
Low costs for grocery retailers	5	2	2	-0.5	0	0
Good image	5	1	0	0	0	1
High punctuality	5	2	1	0	0	1
High profitability	5	1	1	0.5	1	0
More customers	5	2	0	0	1	0
High rate of complete orders	5	0	0	-0.5	0	0
Low costs for customers	4	1	0	-0.5	0	0
Ease for customers	4	2	0	1.5	2	2
Low CO <sub>2</sub> emissions	4	1	1	0	0	0
Low noise for citizens	4	1	0	0	0	0
More comfort for deliverers	4	2	1	0	0	1
<b>Weighted sum score</b>		68	28	1.5	18	22

Weighted sum scores with the weights all on very important (score of 5):

Objectives	Alternatives					
	Weights	Amazon boxes for 'not at home' delivery including cool boxes	To bring substitutes to the doors if certain products are not available	One-click check out to add these products	At every tab of category of products, the discounted or most picked products by the customer are proposed	Message to customer pop-ups 5 minutes before arrival
Low costs for grocery retailers	5	2	2	-0.5	0	0
Good image	5	1	0	0	0	1
High punctuality	5	2	1	0	0	1
High profitability	5	1	1	0.5	1	0
More customers	5	2	0	0	1	0
High rate of complete orders	5	0	0	-0.5	0	0
Low costs for customers	5	1	0	-0.5	0	0
Ease for customers	5	2	0	1.5	2	2
Low CO <sub>2</sub> emissions	5	1	1	0	0	0
Low noise for citizens	5	1	0	0	0	0
More comfort for deliverers	5	2	1	0	0	1
<b>Weighted sum score</b>		75	30	2.5	20	25

### 3. How can the (new) addresses be reached in an efficient and sustainable way?

Weighted sum scores with the weights assigned by the independent researcher:

Objectives	Alternatives					
	Weights	Use customer loyalty programs to gather data (of the location) relevant for delivery in order to better plan next deliveries and allow drivers to write special circumstances on customer's profile	Have planning algorithms based on real-time data and historic data and using a suitable tool	Give promotions, add more responsibility to deliverers with a higher ranking and thus being able to offer more reliable hours	Collaborate with government in order to get subsidies for the costs involved in replacing current fleet with electrical vehicles and making a long-term plan to find other sustainable ways than only using electric vehicles	Letting one company delivering all the groceries with the label of all the partners on the vehicles and clothes, assuring that benefits will be made per order for the grocery retailers and challenging the logistics service provider to achieve benefits from an efficient last mile delivery
Low costs for grocery retailers	5	0.5	1.5	-1	1.5	2
Good image	4	0	1	1	1	-1
High punctuality	5	1	2	1	0	0
High profitability	4	0	0	0	0.5	0
More customers	5	0	0	1	0.5	0
High rate of complete orders	5	0	0	0	0	0
Low costs for customers	5	0	0	0	0	0
Ease for customers	5	0	0.5	0	0	0
Low CO <sub>2</sub> emissions	1	0.5	0.5	0	2	1
Low noise for citizens	1	0	0	0	1.5	1
More comfort for deliverers	5	1	1	1	0.5	-1
<b>Weighted sum score</b>		13	29.5	14	22	3

Weighted sum scores with the weights assigned by the bricks-and-clicks grocery retailer:

Objectives	Alternatives					
	Weights	Use customer loyalty programs to gather data (of the location) relevant for delivery in order to better plan next deliveries and allow drivers to write special circumstances on customer's profile	Have planning algorithms based on real-time data and historic data and using a suitable tool	Give promotions, add more responsibility to deliverers with a higher ranking and thus being able to offer more reliable hours	Collaborate with government in order to get subsidies for the costs involved in replacing current fleet with electrical vehicles and making a long-term plan to find other sustainable ways than only using electric vehicles	Letting one company delivering all the groceries with the label of all the partners on the vehicles and clothes, assuring that benefits will be made per order for the grocery retailers and challenging the logistics service provider to achieve benefits from an efficient last mile delivery
Low costs for grocery retailers	5	0.5	1.5	-1	1.5	2
Good image	5	0	1	1	1	-1
High punctuality	5	1	2	1	0	0
High profitability	5	0	0	0	0.5	0
More customers	5	0	0	1	0.5	0
High rate of complete orders	5	0	0	0	0	0
Low costs for customers	4	0	0	0	0	0
Ease for customers	4	0	0.5	0	0	0
Low CO <sub>2</sub> emissions	4	0.5	0.5	0	2	1
Low noise for citizens	4	0	0	0	1.5	1
More comfort for deliverers	4	1	1	1	0.5	-1
<b>Weighted sum score</b>		13.5	30.5	14	33.5	9

Weighted sum scores with the weights all on very important (score of 5):

Objectives	Alternatives					
	Weights	Use customer loyalty programs to gather data (of the location) relevant for delivery in order to better plan next deliveries and allow drivers to write special circumstances on customer's profile	Have planning algorithms based on real-time data and historic data and using a suitable tool	Give promotions, add more responsibility to deliverers with a higher ranking and thus being able to offer more reliable hours	Collaborate with government in order to get subsidies for the costs involved in replacing current fleet with electrical vehicles and making a long-term plan to find other sustainable ways than only using electric vehicles	Letting one company delivering all the groceries with the label of all the partners on the vehicles and clothes, assuring that benefits will be made per order for the grocery retailers and challenging the logistics service provider to achieve benefits from an efficient last mile delivery
Low costs for grocery retailers	5	0.5	1.5	-1	1.5	2
Good image	5	0	1	1	1	-1
High punctuality	5	1	2	1	0	0
High profitability	5	0	0	0	0.5	0
More customers	5	0	0	1	0.5	0
High rate of complete orders	5	0	0	0	0	0
Low costs for customers	5	0	0	0	0	0
Ease for customers	5	0	0.5	0	0	0
Low CO <sub>2</sub> emissions	5	0.5	0.5	0	2	1
Low noise for citizens	5	0	0	0	1.5	1
More comfort for deliverers	5	1	1	1	0.5	-1
<b>Weighted sum score</b>		15	32.5	15	37.5	10

#### 4. How can the delivery at the customers' place be more efficient?

Weighted sum scores with the weights assigned by the independent researcher:

Objectives	Alternatives					
	Weights	Use direct debit for paying	Smart packages/CRM connected to apps that can send a message to customers on the moment they receive the estimated arrival time and one when deliverer is leaving the previous customer to bring bottles and crates to reimburse money when the deliverer almost reached the address	Options in app to let customers choose a preferred treatment by the deliverer e.g. talkative, assisted placement, customer helping with collecting the groceries or silent & drop	AR to help the deliverer to pick the groceries in the right order and will confirm if it is complete	Using a rating system and opportunity to give tips to the deliverer, which will be evaluated by the team leaders and can lead to more standardized paid trainings in a classroom which is financed by the received tips
Low costs for grocery retailers	5	0	0.5	0	1	-1
Good image	4	0	0	1	0	0
High punctuality	5	0	1	0	1	1
High profitability	4	0	1	0	0	0
More customers	5	0	0	0	0	0
High rate of complete orders	5	0	0	0	1	1
Low costs for customers	5	0	0	0	0	0
Ease for customers	5	-1	1	1	0	0
Low CO <sub>2</sub> emissions	1	0	0	0	0	0
Low noise for citizens	1	0	0	0	0	0
More comfort for deliverers	5	0	2	0	1	1
<b>Weighted sum score</b>		<b>-5</b>	<b>26.5</b>	<b>9</b>	<b>20</b>	<b>10</b>

Weighted sum scores with the weights assigned by the bricks-and-clicks grocery retailer:

Objectives	Alternatives					
	Weights	Use direct debit for paying	Smart packages/CRM connected to apps that can send a message to customers on the moment they receive the estimated arrival time and one when deliverer is leaving the previous customer to bring bottles and crates to reimburse money when the deliverer almost reached the address	Options in app to let customers choose a preferred treatment by the deliverer e.g. talkative, assisted placement, customer helping with collecting the groceries or silent & drop	AR to help the deliverer to pick the groceries in the right order and will confirm if it is complete	Using a rating system and opportunity to give tips to the deliverer, which will be evaluated by the team leaders and can lead to more standardized paid trainings in a classroom which is financed by the received tips
Low costs for grocery retailers	5	0	0.5	0	1	-1
Good image	5	0	0	1	0	0
High punctuality	5	0	1	0	1	1
High profitability	5	0	1	0	0	0
More customers	5	0	0	0	0	0
High rate of complete orders	5	0	0	0	1	1
Low costs for customers	4	0	0	0	0	0
Ease for customers	4	-1	1	1	0	0
Low CO <sub>2</sub> emissions	4	0	0	0	0	0
Low noise for citizens	4	0	0	0	0	0
More comfort for deliverers	4	0	2	0	1	1
<b>Weighted sum score</b>		-4	24.5	9	19	9

Weighted sum scores with the weights all on very important (score of 5):

Objectives	Alternatives					
	Weights	Use direct debit for paying	Smart packages/CRM connected to apps that can send a message to customers on the moment they receive the estimated arrival time and one when deliverer is leaving the previous customer to bring bottles and crates to reimburse money when the deliverer almost reached the address	Options in app to let customers choose a preferred treatment by the deliverer e.g. talkative, assisted placement, customer helping with collecting the groceries or silent & drop	AR to help the deliverer to pick the groceries in the right order and will confirm if it is complete	Using a rating system and opportunity to give tips to the deliverer, which will be evaluated by the team leaders and can lead to more standardized paid trainings in a classroom which is financed by the received tips
Low costs for grocery retailers	5	0	0.5	0	1	-1
Good image	5	0	0	1	0	0
High punctuality	5	0	1	0	1	1
High profitability	5	0	1	0	0	0
More customers	5	0	0	0	0	0
High rate of complete orders	5	0	0	0	1	1
Low costs for customers	5	0	0	0	0	0
Ease for customers	5	-1	1	1	0	0
Low CO <sub>2</sub> emissions	5	0	0	0	0	0
Low noise for citizens	5	0	0	0	0	0
More comfort for deliverers	5	0	2	0	1	1
<b>Weighted sum score</b>		-5	27.5	10	20	10

