

Dissertation

The rise of last-mile food delivery platforms in the city

A case study of Amsterdam



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Abstract

Globally, the food delivery market is a rapidly growing phenomenon which is accelerated by the Covid-19 pandemic. International, national and local market players in terms of food delivery platforms see the revenue opportunities and make their appearances in the city. The services of these platforms are characterised by convenience, offering smartphone apps, wide range of products, and home delivery. The latter service is performed with various logistic network models that contain specific features, which reshape the city. The reforms of the city due to food delivery platforms are urban challenges additional to the existing challenges of urbanization and climate change. Therefore, the research question is raised: *'What do last-mile food delivery platforms mean for the city and urban planning?'*. This question is answered through a case study of Amsterdam. This research showed that ordering practices of the citizen-consumer and the municipal policy gap regarding the last-mile of food delivery platforms, raises tensions in terms of socio-spatial and socio-material in the city. This research suggests to include the last-mile of food delivery in city logistic policy. In cooperation with both large and smaller stakeholders, a long-term vision needs to be adopted to maintain and increase liveability and sustainability.

Key words: *Food Delivery, Last-mile Logistics, Platform Urbanism*

Preface

In front of you lies the dissertation that has been written as a part of the research conducted into the meaning of the rise of last-mile food delivery platforms in the city of Amsterdam. The research has been carried out from March to August 2021. This dissertation describes the most important findings on the reaction of the city on various last-mile operations of the rapidly emerged food delivery platforms. Both tensions and opportunities are raised and conclusions are drawn up in terms of policy recommendations for urban planning.

The dissertation is part of the completion of the Master's Programme of Spatial Planning at Utrecht University, with which I am ending my academic period. During this period and especially this *'last mile'*, I have developed great interest in the dynamics and logistics of the city. I hope to be able to put this interest and knowledge I have gained into practice in the near future.

I would like to thank dr. R.M. Macrorie for her supervision, encouragement and personal approach. I have really enjoyed our conversations and felt supported during this period. I would also like to thank all the respondents for their cooperation otherwise I would not have been able to conduct this research. To my family and friends: Your support and trust kept me motivated. Thank you for always being there to consult.

I hope you enjoy your reading.

Eva Etty

Amsterdam, October 15, 2021

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1. Introduction

Recently, the motion by GroenLinks councillor Elisabeth IJmker to bring forward research of the consequences of 10-minute food delivery for shopping areas, traffic safety, and the streetscape, was supported by a majority of the Amsterdam city council (IJmker, 2021). The reason for this motion had to do with new market players who entered the Amsterdam's food delivery industry in 2021 rapidly, and who introduced the delivery of groceries within 10 to 20 minutes upon ordering in the Netherlands (IJmker, 2021; Wolters, 2021). Globally, the acceleration of such developments, within the food delivery industry, is associated with the Covid-19 pandemic. Policies on mandatory closures of public places and social distancing made it attractive to have various products, including food, delivered at home (Williams, Tushev, Ebrahimi & Mahmoud, 2020). Based on an analysis how the pandemic has impacted production and the buy side, the value of the worldwide online grocery market, between 2020 and 2027, has been estimated to be at the order of a compound annual growth rate (CAGR) of 15,7% (Research and Markets, 2020). However, long before the pandemic occurred, food was already being delivered to the consumers' doorsteps (Navis, Fisher, Raffaelli, Glynn & Watkiss, 2012). In the 00's home food delivery started to take a different form. Online delivery platforms were introduced which show a variety of nearby restaurants with home delivery services. Moreover, other forms of home food delivery emerged around the year 2011. The first subscription-based meal boxes made their entrance into Europe's home-delivery industry (Khan & Soward, 2018; Wunsch, 2021). These developments made home delivery of food a lot more popular, and this is nowadays developing into an international niche market. Since 2017 revenues from the online food delivery industry have been rising worldwide, and these are expected to exceed \$85 billion revenue by 2024, representing an increase of about 60% compared to the industry's \$53 billion revenue in 2019 (Lock, 2021).

Explanations for these rapid developments, and revenue increases, in the food delivery industry have to do with the entanglement of online technology and e-commerce in daily life. Consumers and businesses have the possibility to engage, non-stop and worldwide, in (commercial) activities because of the unlimited temporal and spatial boundaries due to the advance of World Wide Web technologies and smartphones (Kim & Lee, 2002; Poong, Zaman & Talha, 2006; Nguyen, de Leeuw & Dullaert, 2018; Sommar

& Mellander, 2018; Zhu, 2019). This has led to a rapid growth of digital platforms that address many dimensions of social, political and economic life (Barns, 2019). Digital platforms offer services, through access to the Internet, that allow users to be both creators and consumers of content, thereby benefiting from network effects (Feld, 2019). These developments have led to a change in consumer behaviour and in good distribution. Traditional supply chains changed from B2B (Business-to-Business) to B2C (Business-to-Consumer), which resulted in more kilometres to cover in order to deliver products, and challenges, such as failed deliveries, loading and unloading facilities, unsuitable infrastructures or regulations, that must be complied with (Butrina, Del Carmen Girón-Valderrama, Machado-León, Goodchild & Ayyalasomayajula, 2017; Yu, Wang, Zhong & Huang, 2017; Ranieri, Digiesi, Silvestri & Roccotelli, 2018; Bates et al., 2018; Sommar & Mellander, 2018; Olsson, Hellström & Pålsson, 2019; Bjørgen, Bjerkan & Hjelkrem, 2019; Viu-Roig & Alvarez-Palau, 2020). Companies have their own operational logistics strategies to deal with such matters, but at the same time these contribute to the same goal: supplying the city. Although cities have been dealing with goods transport since Roman times, it is only recently that the importance of this type of transport has been recognised and incorporated into urban planning (Gonzalez-Feliu, 2018). Due to this only recent recognition, knowledge on the incorporation of logistics in urban planning is still little developed. It is therefore not surprising that the rapid emergence of e-commerce has increased the need for knowledge about transport flow management in the urban environment (Viu-Roig & Alvarez-Palau, 2020).

In addition, the entanglement of platforms in urban life goes beyond e-commerce and the changes in consumer behaviour. Platforms have an increasing infrastructural role to urban services by reshaping urban circulations (Bissell, 2020). Examples are Uber, Airbnb, Deliveroo which changed transport, accommodation and food delivery. Both visible and invisible urban circulations are reshaped by algorithm-based strategies, management and policies (Barns, 2019; Griesbach, Reich, Elliott-Negri & Milkman, 2019; Bissell, 2020). For instance, information analyses based on algorithms goes beyond the focuses on customers' demands and content to deploy precision marketing, since algorithms analysis are used to route planning, accessibility of the city and other traffic related data (Cagliano, Gobbato, Tadei & Perboli, 2014; Zhu, 2018; Bates et al., 2018; Zhu, 2019; Deloitte, 2020). The role of this kind of technology has grown and thus shapes the city. Although these developments tend to make everyday life more comfortable,

questions are raised about the social desirability, labour circumstances, privacy, transparency, power distribution and regulation (Dablanc et al., 2017; Scholz, 2017; Richardson & Bissell, 2019; Barns, 2019; Viu-Roig & Alvarez-Palau, 2020; Bissell, 2020; Richardson, 2020a; Mcneill, 2021). In terms of urban planning, these matters cannot be denied. The rapid emergence of digital platforms for food delivery, and last-mile delivery in particular, will need to be taken into account when considering policy measures and city planning.

In the academic literature, research on the rise of platforms is dominated by business, technical, sociological perspectives, and less research has been done in the field of urban planning. However, some scholars have made useful contributions to this. Barns (2019) explores the relational dynamics between commercial platforms and everyday technology that shape socio-spatial experiences. Richardson (2020a) looks at platforms as flexible spatial arrangements. She pointed out a promising role for platforms in the organisation of cities, with the caveat that a fair distribution of values is generated through the coordination of urban actors. McNeil (2021) explains the role of global platform companies in shaping urban market geographies, urban governance and regulatory challenges posed by different types of capital, and the impact of apps and platforms on the behaviour of urban life. Richardson (2020b), Bissell (2020) and Chai & Yat (2019) focused on food delivery platforms, in particular, by investigating the experiences of workers who deliver food for these food delivery platforms and the reshaped food consumption practices as a result of these digital on- demand platforms.

As a contribution to the discipline of urban planning, this research focuses on the case of Amsterdam, responding to the last-mile delivery of food delivery platforms, by examining the various concepts and management flows regarding food delivery, the practices of citizen-consumers and local government, and the demand for home delivered food driven by the Covid-19 pandemic and beyond. Through the concept of assemblage thinking, this study aims to provide insight into tensions due to the emergence of last-mile of food delivery practices in the city as well as opportunities related to urban planning. Assemblage thinking allows to connect interrelationships of food delivery platforms, which are structuring both urban networks and socio-spatiality in the city. This knowledge could enable local governments to identify emerging tensions as well as opportunities related to food delivery platform practices in urban planning, evaluate current policies, and implement policy recommendations.

1.1 Problem Definition and Research Questions

Increasing pressure on cities, and the lack of in-depth knowledge of policy measures with regard to the impacts of e-commerce on urban areas, can lead to increased tensions (Su et al., 2013; Barns, 2019; Viu-Roig & Alvarez-Palau, 2020). It is rather difficult for authorities to anticipate to rapid e-commerce developments, as new platforms often create online niche markets each having their own last-mile delivery features (Van der Graaf & Ballon, 2019; Viu-Roig & Alvarez-Palau, 2020). The food delivery market makes it difficult to maintain the balance in cities, as different modalities with last-mile delivery features develop in the short term. On the one hand, the authorities must ensure an efficient supply of the city in order to provide its citizens with access to primary needs, such as groceries, but on the other hand authorities need to ensure, and improve, the city's liveability, safety and sustainability. This research will highlight the socio-technical relationship between actors and agents (i.e., human and non-human entities) within the urban space, by focusing on last-mile delivery operations of food delivery platforms, as to determine the rising tensions and opportunities, and the meaning of this, in planning the city. Also, the consequences of the pandemic actions taken by the authorities have shown that citizens and companies are able to adjust quickly in order to maintain daily life. However, this requires assessing and understanding the consequences in order to give meaning to the ways our future cities are planned.

This urban challenge is looked into by means of the case of Amsterdam. The capital city of Amsterdam is attractive for companies to launch their food delivery platform concepts, as the number of food delivery platforms grew rapidly in a short period of time in 2021 (Wolters, 2021; NOS, 2021b). This prompted politicians to support IJmker's (2021) proposal to investigate the consequences of flash delivery for shopping areas, traffic safety, and the streetscapes. In 2017, the Dutch people became Europe's largest online group of grocery purchasers, which makes a Dutch city interesting to look at more in-depth (Ecommerce News, 2018). Also, Amsterdam is an interesting city in relation to last-mile delivery. Its bicycle infrastructure and culture aid the transport modes of the food delivery platforms and the impact on elements of the city (Schepers, Twisk, Fishman, Fyhri & Jensen, 2017).

The following research question is formulated in order to do in-depth research: *'What does the rise of last-mile food delivery platforms mean for the city and urban planning?'*. To answer this question, related sub-questions have been formulated:

1. What platformised modes of last-mile food delivery are emerging in the city?
2. How is the city responding to the last-mile logistics of the rising food delivery platforms?
3. What tensions and opportunities are associated with the rise of last-mile food delivery platforms in the city?

1.2 Scientific relevance

In the literature, there is a tendency to consider public authorities in terms of platforms for open governance or transparency, rather than the relationship with regulating the planning of the city. Little previous research on platforms concerned the relationship to urban planning, such as how platforms influence and reshape urban space and mobility. Instead, academic literature emphasizes the infrastructural role of platforms concerning platforms as new capitalist models posing a threat to the distribution of power and transparency of both private and public parties (Langley & Leyshon, 2017; Scholz, 2017; Srnicek, 2017; Van Doorn, 2017; Ananny, 2018; Plantin, Lagoze, Edwards & Sandvig, 2018; Richardson & Bissell, 2019; Seidl, 2020; Rose, Raghuram, Watson & Wigley, 2021). The useful contributions to the urban geography discipline concern socio-spatial perspectives. Literature explains the organisational role of platforms for cities by a balanced coordination of urban actors and food platforms reshaping consumption practices and labour conditions (Barns, 2019; Chai & Yat, 2019; Richardson, 2020; Bissell, 2020). McNeil (2021) also involves policy and capital aspects in addition to reshapes in geographies and impact on urban life. Empirical research, in particular, focusses on how food delivery platforms reshape the city and the ways urban actors and agents (i.e., human and non-human entities) react on this. By taking both entities into account in consideration of reshaped urban space, the study contributes to the scientific knowledge related to assemblage thinking and the Actor Network Theory (McFarlane, 2010). This study also contributes to the urban planning discipline by highlighting the rise of the variety of last-mile operations of the food delivery platforms (including operational scales, distribution centres locations, logistic network models, transport modes, delivery times, and relationship with consumers), current government and citizen-consumers practices, and expectations of the future demand for food delivery platforms in the urban area, by determine the tensions and opportunities arising in the city to maintain or increase the liveability and sustainability of the city.

1.3 Social relevance

In terms of ensuring a liveable and sustainable city, local authorities face complex urban challenges. This complexity is influenced by the increased density due to population growth, the urgency of transitions due to climate change, and the rapid emergence of e-commerce and on-demand platforms changing urban dynamics (Olsson et al. 2019; Viu-Roig & Alvarez-Palau, 2020). Cities are becoming denser whilst the majority of the world's population is already living cities (UN-Habitat, 2020). This, combined with the increase in delivery practices, parcel flows and their consequences, will increase the pressure on cities worldwide. For instance, the motion by the GroenLinks party of the Amsterdam's city council was put forward because it is expected that lightless stores and flash deliveries have a negative effect on the attractiveness and liveability of shopping areas. Moreover, German bicycle couriers have expressed concerns about poor working conditions and safety risks associated with fast online shopping services (Ijmker, 2021). The concerns about road safety also apply for city dwellers, as unsafe feelings by Amsterdam citizens partially stem from parcel delivery (Gemeente Amsterdam 2020a). In addition, the way that cities will function or are being planned in the future are dependent on the way technology and data is used (Ash, Kitchin & Leszczynski, 2018; Barns, 2019; Davies, 2019; Griesbach et al., 2019; Safransky, 2019; Bissell, 2020). Also, during the spread of Covid-19, an acceleration in the degree of technology and delivery practices in everyday life happened (Colliers, 2020). The adaptive capacity of humans is virtually boundless and has consequences for the spatial planning of the living environment. As policy making is lagging behind, the relevance for focusing on the city's perspective (i.e., municipality) of this research is accurate (Viu-Roig & Alvarez-Palau, 2020). Understanding how to best plan and manage cities is therefore of the utmost importance, given that this trend is inevitable, and given that it is also set against population growth and the need for sustainable cities.

1.4 Reading Guide

In sequence, this dissertation consists of the chapters: Literature Review, Methodology, Results, Conclusion and Discussion.

The *Literature Review* section consists of information gathered from academic literature. In general, this chapter provides an overview of relevant theories, insights about previous research and concepts related to the topic of last-mile delivery of food

delivery platforms and urban planning. In addition, this chapter explains the application of McFarlane's (2010) concept of assemblage thinking as a conceptual framework for the analysis of the research, which is based on the overall analysis of academic literature.

The next chapter, *Methodology*, explains the process of answering the research questions and its validity and reliability, by giving a detailed description of the choices made and the steps taken in the research process to collect and analyse empirical data. The chapter begins with an explanation of the mixed-methodology as an appropriate research method and the relevance of Amsterdam as a case study. Subsequently, the process of qualitative and quantitative research is described, as well as the privacy and ethics procedures that were taken into account. The chapter concludes with statement on the quality of the research.

The chapter *Results* highlights the empirical data of this research, by sequentially discussing the operational last-mile delivery methods of different food delivery platforms in Amsterdam, the view of local government and citizens-consumers of Amsterdam on this, as well as on the emerging tensions and opportunities. Here an overview is given of the various food delivery concepts in Amsterdam, the local policies on last-mile delivery and the citizens-consumer practices regarding food delivery platforms in Amsterdam. Based on the empirical data, this chapter concludes that paradoxes arise between which tensions and solutions are trapped.

This dissertation finishes with the chapters *Discussion* and *Conclusion*. The Discussion section draws on the implications of the results by answering the sub-questions there. The last chapter, Conclusion, gives an compact formulated answer to the main question and suggests policy recommendations. Finally, the limitations of this research are discussed by highlighting the problems encountered in the preparation of this research are discussed.

2. Literature Review

Throughout modern history, cities are confronted by flows of goods to supply the city. However, the urban planning of city logistics in this regard is still very young. Since the second half of the 20th century, city logistics has been given a more dominant place in planning. The 1950s saw the dawn of a new era of city logistics, which was initiated by the increasing urban sprawl and by large-scale road construction for the automotive sector. The market was ruled by quasi-exclusive private stakeholders, and the development of transport and logistics stakeholders during this time has been shaped by two issues. First of all, city planners at that time had limited knowledge about the logistics sector. The transport of people was prioritized in the construction and planning of cities, but the transport of goods was not taken into account. In addition, companies of all sizes were able to specialize in freight and transportation logistics due to the industrialization. This ensured an easy access to cities for commercial vehicles. For those reasons, private stakeholders determined city logistics (Fossheim & Andersen, 2017; Gonzalez-Feliu, 2018). Whilst cities were still being developed and organized with the priority of personal mobility in the 1970s, economic activities remained vital to the success of urban areas. Due to the increase in the urban population, the flows of goods in order to supply the cities also increased. During this time, research on urban freight transport first emerged in academic literature, as researchers focused on the last-mile transport of commercial and industrial activities. However, government agencies only started to take an interest in the transport of goods a number of years later. In Europe, governments first started regulating logistic matters in the 1980s. Although these regulations were temporary in nature, the rules mainly concerned access regulations, or parking restrictions, that were implemented locally by municipalities, without any coordination at a regional or national level. From the 1990s onwards, the concept of urban freight transport was approached by several countries. Concepts and coordinated actions were initiated by both public and private stakeholders (Gonzalez-Feliu, 2018). Today, in addition to the urban sprawl, city logistics are faced with a proliferation of on-demand digital platforms delivering consumer services activities. Using mobile digital devices, consumers can now instantly access services such as transport, goods and food delivery (Bissell, 2020; Richardson, 2020). The resulting currents give substance to the city's logistics case. Globalisation and digitalisation have led to simplified production and procurement, and various delivery

options, which has changed consumer landscapes and urban goods distribution (Sommar & Mellander, 2018; Zhu, 2019). In addition, these services are not temporary, as the society's dependency on such technologies and services became clear when the Covid-19 pandemic spread worldwide within a couple of months. Habits and daily routines were disrupted by mandatory closures of offices, stores and restaurants, but these could be kept running by shifting their operations from a physical to a digital format. Despite that the e-commerce sector was already rapidly growing at the time, the increase of e-commerce and food delivery accelerated substantially due to the pandemic (Williams et al., 2020; Keyes, 2021). In order to properly integrate logistics into urban planning, it is necessary to examine how the on-demand platforms relate to urban planning.

The aim of this chapter is to provide background knowledge about the academic discussions and concerns with regard to last-mile delivery of food delivery platforms and urban planning. In the first paragraph the relationship between technology and the city, by explaining how digital platforms are integrated in urban life and which concerns are raised regarding this, is discussed. The second paragraph is divided in four parts; food delivery platforms, concerns with regard to food delivery platforms and urban planning, last-mile logistics and city planning. The paragraph highlights the various business and logistical models of food delivery platforms, and concerns on this matter, the role of logistics in urban planning and the reasons and difficulties for including logistics in urban planning. Based on the literature a conceptual framework for this research is presented in the last paragraph.

2.1 Platform Urbanism

During the last decade, technology has been used to improve urban life by both private and public parties. Around the year 2010, the *Smart City*, and its data circulations, attracted much more attention in both the academic literature and in international policies (Albino, Berardi & Dangelico, 2015; Rose et al., 2021). The Smart City was formed into a corporate product, a form of city policy, and an urban brand. Also, due to worldwide urbanization, the importance of sustainable urban areas as a global phenomenon became clear (Albino et al., 2015; Silva, Khan & Han, 2018; Rose et al., 2021). In the literature different definitions are used. Some define Smart City as an urban environment where physical, social, business and ICT infrastructure are connected to increase the intelligence of the city (Harrison et al., 2010), whereas others use the definition for Smart City as being

an advanced modern city that improves the quality of life, competitiveness, operational efficiency of urban services through ICT and other technologies, whilst ensuring the availability of resources for current and future generations in terms of social, economic and environmental aspects (Silva et al., 2018). Although different definitions are used, the key features here are ICT-related adjustments, stimulated by policies to shape different kinds of aspects of the city to improve the inhabitants' lives (Harrison et al., 2010; Albino et al., 2015; De Jong, Joss, Schraven, Zhan & Weijnen, 2015; Silva et al., 2018; Leyerer, Sonneberg, Heumann & Breitner, 2020; Heumann & Breitner, 2020). Examples are information and telecommunication infrastructures (De Jong et al., 2015).

However, the phenomenon to improve urban life by using technology goes beyond the essence of the extensive and advanced ICT facilities being offered throughout the urban area. Municipal city services are being made more efficient by the use of digital tools and big data. Recent discussions focus on city authorities working with private companies to make cities more efficient and sustainable, through the collection, analysis and integration of big, geolocated, real-time digital data (Rose et al., 2021). Local governments are often unaware of existing data and smart systems, because smart systems are implemented in small functional areas and are generally funded, built and managed individually without a common planning or strategy for the entire municipality (Soyata, Habibzadeh, Ekenna, Nussbaum & Lozano, 2019). In addition, the use of big data comes with the major challenge of processing and managing this data (Ismagilova, Hughes, Rana & Dwivedi, 2020). The threats to data management stem from information security, data privacy and cyber-related factors, where unauthorised access can lead to undesirable consequences (Soyata et al., 2019). The analysis of a wider range of organisations using all kinds of digital devices to collect data from urban environments provides insights into the efficiency and the generation of profits through extraction, circulation, transformation, commodification, integration, storage, and re-use of data (Rose et al., 2021). Such an analysis can be used to improve urban systems, but can also be of financial value for private parties in connection with commercial purposes. Its application in the urban environment, comes on top of the discussion on mass storage and management of information in smart cities (Rose et al., 2021).

The broader context of the commodification and extraction of personal data information, deemed to be of financial value through its collection and analysis, can be considered *platform capitalism* (Langley & Leyshon, 2017; Rose et al., 2021). The term

refers to the effects of platform digital technology on capitalism (Srnicsek, 2017; Steinberg, 2021). Platforms can essentially be seen as new business models bringing various groups (creators and consumers of content) together in terms of (online) networks (Srnicsek, 2017; Feld, 2019; Steinberg, 2021). Richardson (2020a) points out that the urban manifestation of platforms shows parallels with the French *agencement* translated in English to *assemblage*, indicating “a collection of things” (WP Phillips, 2006, p. 108). This indicates the process of the integration and connection of elements, where the connections and their arrangements provide context for assigned meanings (WP Phillips, 2006). In the literature platforms are primarily seen as economic actors acting on business demands. However, platforms cannot be reduced to the organization of a company, because these platforms manifest themselves in cities through the coordination of existing and sometimes urban networks (Srnicsek, 2017; Richardson, 2020a). In other words, building on the systems of smart cities, platforms are mechanisms to extract data by providing the required digital infrastructure for content creators and users which develop into networks that give meaning to their value. These networks demonstrate the flexible spatial arrangements delineated by a series of networked urban entities beyond those of the interface and the algorithm (Richardson, 2020a). In contrast to smart city systems, urban platforms involve direct connection and interaction with consumers, rapid scaling through network effects and venture capital, and are thus more hostile to government regulation and established industries (Sadowski, 2020 p. 2). Therefore, *platform urbanism* considers how the increasing infrastructural role of digital platforms contributes to urban services, such as transport, housing, accommodation and food delivery, thereby reshaping the way energy works and evolve in the (social-technical) relationship between the city and digital technology (Bissell, 2020; Lee, Mackenzie, Smith & Box, 2020).

Platform Urbanism: Concerns for Urban Planning

Public administration is no longer the exclusive provider of urban services, as the interconnection of networked digital platforms in everyday life and ‘deregulations’ (i.e., (semi- or full privatisation) result in economically competitive alternatives (Plantin, Lagoze, Edwards & Sandvig, 2018; Ferreri & Sanyal, 2018). Urban services and infrastructures can be seen as *platformised* (Plantin et al., 2018). However, the provision of urban services, by both public and private parties, is not a new phenomenon. The

challenge here mainly focuses on the almost invisible entry of new services with little transparency, which change infrastructures and rearranges urban dynamics. On the one hand with platforms public space is being translated into codes and, on the other hand, codes are reshaping urban life (Van der Graaf & Ballon, 2019). For urban planning, this means challenges related to the increasingly self-organising nature of urban functioning, in relation to ICT and on-demand services, the physical transformations that this entails, and outdated regulations and lack of knowledge that, with the rapid rise of platforms, are not attuned to the new conditions and cause non-compliance (Barns, 2019; Van der Graaf & Ballon, 2019; Viu-Roig & Alvarez-Palau, 2020). In the literature concerns are raised with regard to disproportionate power, transparency, acquisition of data, entanglement of urban life, equal access, labour conditions and appropriate regulations.

Critiques about data safety and acquisition are a common thread in the discussion of platform urbanism, as disproportionate exercise of power can arise (Scholz, 2017; Richardson & Bissell, 2019; Bissell, 2020). Therefore, vigilance in regard to systems offered by private parties, and the use of data by governments, is a concern for urban planning. Municipal authorities invest in urban operating systems platforms aimed at transforming both services and infrastructures (e.g., shared mobility, load infrastructures, and automated system for public transport) (Marvin & Luque-Ayala, 2017). However, the application of such systems in urban planning must be viewed critically because of potential disproportionate government surveillance, limitations of privacy and potential data abuse by both government and third parties (Marvin & Luque-Ayala, 2017; Barns, 2019).

Platforms aim to provide convenience; however, it should not be underestimated what these platforms mean for the entanglement of urban life, equal accesses to participate in urban life and under what circumstances these occur (Shepard, 2013; Langley & Leyshon, 2017; Ash, et al., 2018; McNeill, 2021). On-demand platforms influence the urban daily lives in many ways which, in terms of urban planning, also affect spatial, ecological and social aspects. Platforms such as Airbnb, Uber, Amazon and Deliveroo, are changing residential compounds due the influx of tourists, travel patterns by the range of mobility services and extends the operational range of retailers and restaurants (Dablanc et al., 2017; Ferreri & Sanyal, 2018; Richardson & Bissell, 2019). Tightening policies become necessary to deal with blurring boundaries (Ferreri & Sanyal, 2018). The Amsterdam's policy is an example of this. Since 2021, in addition to a

maximum number of persons and nights, renting out a flat is subject to a permit requirement (Gemeente Amsterdam, n.d., d).

Big tech companies, whose digital platforms act as infrastructural dimensions, shirk their social responsibilities by evading regulation on a massive scale, and creating unjust working conditions, all while their infrastructural dimensions are based on the exploitation of digital workers (Scholz, 2017; Richardson & Bissell, 2019; Bissell, 2020). Some on-demand platforms create precarious employment relationships, taking away rights to unionisation, health insurance or retirement benefits (Dablanc et al., 2017). Despite new labour opportunities that arise due to on-demand platforms, the labour circumstances are critically discussed. This mainly concerns entanglement in urban life. Griesbach, Reich, Elliott-Negri, & Milkman (2019) highlighted, in line with Richardson's (2020b) view, that labour conditions and opportunities within the on-demand delivery market are driven by algorithms. Besides the concerns about the privacy matters of the employees in regard of these algorithms, one's income depends on the number of delivery tasks which can create insecurity for employees (Dablanc et al., 2017; Griesbach et al., 2019; Richardson; 2020b). In addition, Dablanc et al. (2017) highlight the *Uberization of jobs* by which the share of jobs carried out by independent contractors using digital platforms is meant (Dablanc et al., 2017, p. 11).

Furthermore, cities are somewhat privileged as successful platforms are the first or the only ones to enter urban areas, or, in some cases are the only suitable ones for the city, due to their way of operating (Dablanc et al., 2017). Moreover, within cities, areas are differentiated by the fact that platforms offer their services in an area of their choice. This reduces the equality and access to urban services. The access and facilities of a location influence urban planning. It is difficult to anticipate this; it may be necessary to provide facilities by the government, to prevent citizens from being excluded, or the market may eventually solve such problems on its own. As mentioned earlier, the invisibility and lack of transparency of platforms complicates urban planning (Van der Graaf & Ballon, 2019). This shows that platforms are more than actors, as a series of networked urban entities are associated with flexible spatial arrangements as Richardson (2020a) described.

2.2 Food delivery platforms, last-mile logistics and city planning

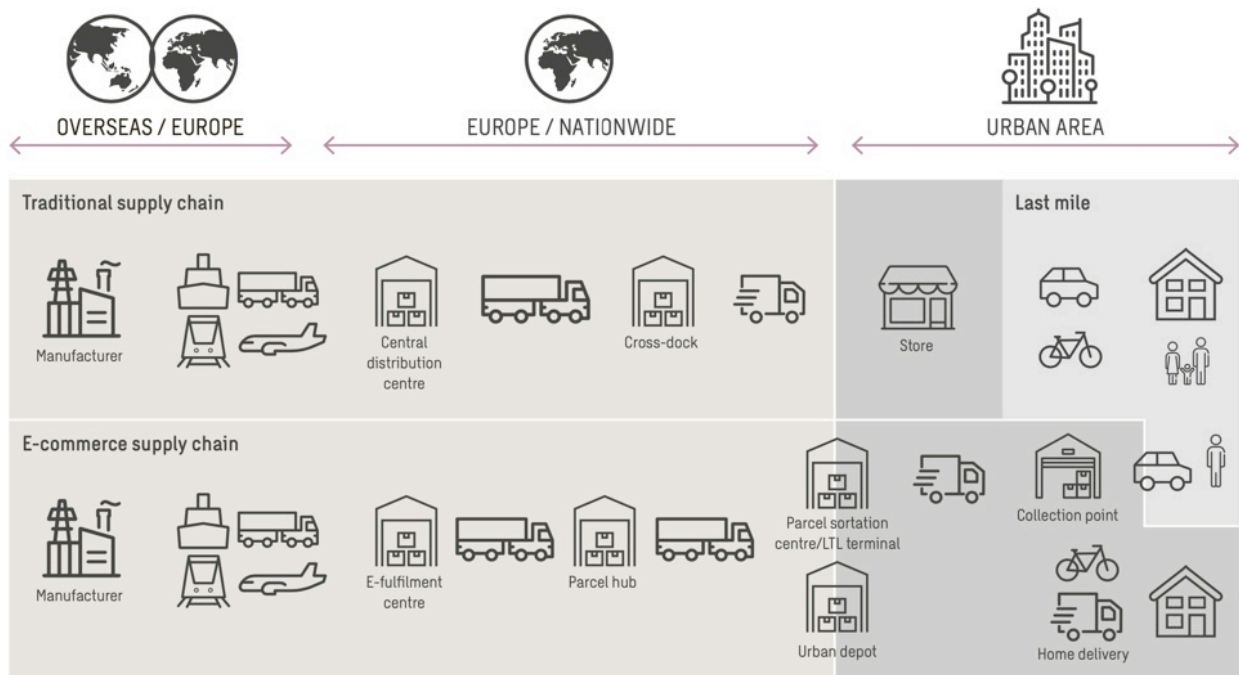
Ordering food is not a new phenomenon. The first food delivery services were limited to local groceries (i.e., the greengrocer or milkman) which were delivered once or twice per

week (Navis et al., 2012). Nowadays, new technology models of food delivery services are enabling consumers to order daily and weekly groceries, prepared meals or meal boxes with recipes through mobile apps and have it home delivered at their leisure. Fast search functions direct consumers to restaurants or products of their choice, which are then added to their shopping basket. Before the order is placed, the consumer already has insight into the estimated delivery time for their designated location. Delivery drivers are linked to the order as soon as it is placed. In the context of weekly shopping, or meal boxes, the operator will show the range of available delivery methods and times and the consumer will pick a preferred method and timeslot. Through smart tracking functions, the orders can be tracked via the apps used. In the meantime, the apps record the consumers' preferences (Williams et al., 2020). The development of e-commerce, promotion of third-party payment solutions, the growth of the home-based economy, and the increase of smartphone usage stimulate the rapid developments and competition of such apps, referred to as food delivery platforms (Dablanc et al., 2017; Khan & Soward, 2018; Barns, 2019; Bissell, 2020; Williams et al., 2020; Wunsch, 2021).

Food delivery platforms, considered to be B2C models, have variety of Logistics Network Models (LNM) and tend to bring disruptive innovations that create new urban issues (Richardson, 2020b). Traditional consumption landscapes change which reshapes supply-chains and distribution. Figure 1 depicts a schematic view of the increased complexity by the advent of the B2C e-commerce supply chain. It shows that circulation of freight is increasing, especially in the urban area, as well as the role of distribution centres and collecting points (Sommar & Mellander, 2018). The traditional B2B supply chain has a clear boundary about the extent of the business-controlled service, while the e-commerce B2C supply chain is featured by managing item-level order fulfilment and last-mile logistics (Sommar & Mellander, 2018; Olsson et al., 2019). Last-mile logistics represents the final link between the production and customers, in short (Olsson et al., 2019). In the B2B chain the last-mile is taken care of by consumers themselves, while the B2C retailers strengthen their services by efficient last-mile management (Sommar & Mellander, 2018). Last-mile delivery is often referred to as home deliveries, while currently delivery options are expanded by the addition of pick-up points, parcel lockers, and click-and-collect services (Cardenas et al., 2017; Bjørgen et al., 2019; Ulmer & Streng, 2019; Deloitte, 2020; Leyerer et al., 2020). These services allow consumers to collect the online purchase in person at their own conveniences. To ensure sufficient last-mile

deliveries managing LNM is required. An appropriate LNM depends on business services and products features. This determines the distribution size and location, and the transport mode of parcel vehicles (Butrina et al., 2017; Bates et al. 2018). The increasing variation of network models and logistic operations affect urban planning.

Figure 1: Increased complexity in urban area due to B2C delivery



Source: Sommar & Mellander (2018)

The literature points out that the last-mile delivery of B2C food delivery services has changed individual travel patterns and distribution operations, with consequences for the everyday urban life, traffic and mobility matters, environmental matters and spatial matters (Weltevreden & Rotem-Mindali, 2009; Bjørgen et al., 2019). This section will explain these matters in further detail, and will provide background information in order to better understand the relation between the food delivery platforms, city logistics and urban planning.

Food Delivery Platforms

The food delivery platforms can be distinguished in platforms offering takeaway meals (prepared food), meal boxes (meal kits with recipes and pre-portioned ingredients) and in grocery and alcohol delivery platforms (Dablanc et al., 2017). Commonly platforms are specialized in one of these groupings and do not combine the different concepts.

Significant for today's food delivery platforms concepts are two former e-commerce business models, which operate by different LNM. This section explains these differences and in table 1 an overview of the comparison is shown.

The first e-commerce business model is where *Bricks and Clicks* retailers, with an existing store network, are developing systems that allow consumers to buy goods online too (Richardson, 2020b). This model is particularly interesting for existing supermarket retailers, as these retailers can build on an existing store network, both cliental as well as logistical, and add home delivery through an online ordering system. Both the existing network and the retail locations themselves can be transformed into an online sales environment. By equipping conventional supermarkets with automated micro fulfilment centres at the back, both models can be combined. This is also known as omni-stores (Grudzien, 2020). Commonly, the Bricks and Clicks retailers use a LNM, called the *self-support model*, to perform the last-mile delivery. This means that the last-mile service is organised by the company itself (Yu et al., 2017). To ensure the logistics service quality, a self-support model, with its own logistics service network, can be advantageous there, as the last-mile service is one the most important factors for successful e-commerce business. For the online purchases of food and groceries consumer expectation for last-mile delivery is crucial according to the report of Capgemini (2018). The last-mile delivery has a customer service-oriented aspect, as in this stage the consumer purchasing online comes into personal contact with the retailer for the first time. Moreover, the reduction of customer satisfaction, or even customer loss, can be caused by a slight shortcoming in the last-mile delivery (Hübner., Kuhn, Wollenburg, Towers & Kotzab, 2016; Capgemini, 2018). The downside of such a network is the pressure to fully manage the network, as it has to cover on national or even global scale (Yu et al., 2017).

Another e-commerce business model is where the *Pure-Play E-tailers*, through the advent of the internet, create disruptive innovations in which new business models pose a threat to existing retailers or (communication) services (Richardson, 2020b). By the fact that e-commerce companies only sell online, the term Pure-Play often refers to a niche market. These Pure-Play E-tailers platforms can easily generate data to supplement the supply and stock in order to better serve their customers, because of exclusively selling online (Richardson, 2020b). Within this new business model there is a certain variety. This has to do with the products they offer (i.e., groceries, meal boxes or takeaways), but also with the characteristics of the operation, location and delivery. The Pure Play E-

tailers in the food delivery industry can be distinguished into the classical e-commerce model, where products in the form of groceries or meal boxes are offered as an online product and delivered to the consumer, but also as a more complex form of e-commerce, where groceries or a prepared meals are purchased online but the delivery of these goods is taken care of by a third party. These companies generally define themselves as intermediate technology platforms, as to enhance the connection between users, companies and private independent contractors or third-party suppliers for collection and delivery services (Dablanc et al., 2017).

The first type is commonly using the self-support model for the last-mile logistics for the same reasons as the Bricks and Clicks retailers do. Although, these players do not have existing store networks, they made the last-mile delivery one of their qualities (Capgemini, 2018; Deloitte, 2020). A Dutch example of such a company is Picnic. The other type is depending on external logistic services. By this independent logistic service suppliers which are specialised in the distribution of goods is meant (Deloitte, 2020). In short, last-mile delivery is their product. For instance, apps such as the Dutch Thuisbezorgd.nl, connect the self-employed deliverers and the order for take-away meals to cover the last-mile. This is the kind of labour that, according to Dablanc et al. (2017), results in the ‘Uberization of jobs’. The external logistic services models are considered to be an *outsourcing model* (Rose et al., 2017; Yu et al., 2017). Some disadvantages of this model are the lack of control and missing out on profits from the logistics process itself. On the other hand, companies may not be able to profit from the last-mile. or choose not to do so in order to focus on quality of their product (Yu et al., 2017).

Table 1: Comparison e-commerce models and last-mile logistics of food delivery platforms

E-commerce Model	Business type	Last-mile	Network	LNM
Brick and Clicks	Existing supermarket retailers	Classical B2C	Existing store networks	Self- supporting model
Pure-play E-tailers	E-commerce companies	Classical B2C	Self-development	Self- supporting model
Pure-play E-tailers	E-commerce companies	Third party	Network third party	Outsourcing model

The above explains the various concepts of food delivery platforms, but new physical concepts have also emerged which are subordinate to platforms. Many terms, such as *dark*, *ghost*, *cloud*, *smart* or *delivery-only kitchens*, are used but all of these refer to a model by which meals can exclusively be purchased through delivery channels. The concepts consist of a kitchen only, without offering a physical dine-in experience or their own platform services (Deliverect, n.d.). This concept is fully dependent on services of the existing food delivery platforms, which basically means dependency on the outsourcing models of the Pure-play E-tailers. A similar concept has emerged in the grocery industry. Pure-play E-tailer platforms offer a concept in which groceries are exclusively purchased through their online delivery channel, which are delivered within 10 to 20 minutes, which is also known as *flash delivery* or *instant delivery* (Van Glabbeek, 2021). In contrast to the Bricks and Clicks retailers, or Pure-Play E-tailers with classical e-commerce features, these platforms are using *dark stores* meaning small warehouses across the city where the groceries are stored and picked-up by drivers for delivery. Every dark store has its own delivery area, in order to be able to ensure the offered short delivery time (Grudzien, 2020; Mason, 2019).

Food Delivery Platforms: Concerns for Urban Planning

Concerns in the literature about digital platforms and urban planning have already been introduced. The following section will explain the concerns with regard to food delivery platforms and urban planning, such as road safety, the existence of physical establishments, the change in streetscapes, freight transport facilities, and environmental matters.

In addition to the concerns about labour conditions, the labour conditions in the food delivery industry can cause unsafe road conditions. The food delivery industry has created a demand for fast deliveries, which sometimes means that a delivery within 5 to 8 minutes is putting pressure on the delivery process. Despite the given that customers and companies benefit from the risks taken by the deliverers, road safety is at stake (Koops, 2021). Although Dablanc et al. (2017) label this as labour-related, safety on roads and cycle paths is also at stake which affect the general interest of the city. It is therefore important to incorporate this matter in urban planning. Concerns also relate to the lack of academic discussions, or municipal analysis on road safety for bicycle couriers in particular (Dablanc et al., 2017). Referring to the opening statement of this study, in which

Ijmker (2021) submits a motion for further research on this subject, municipal attention to this is increasing.

The rise of e-commerce is changing the extent to which physical purchases are made and to the geographical locations of retail. As food delivery platforms emerge from the rapid growth of e-commerce, these issues also affect the food supply in urban areas (Dablanc et al., 2017; Richardson, 2020b; Bissell, 2020). Since online food ordering is a form of self-service it might replace traditional dining establishments (Richardson, 2020b; Bereitschaft & Scheller, 2020). This threat to customer interaction and traditional dining establishments is enhanced by the dark kitchen concepts, because traditional dining establishments are not able to compete with the larger profit margins, the quicker deliveries, and the lower prices offered by dark kitchen restaurants (Deliverect, n.d., Bereitschaft & Scheller, 2020). Moreover, the concept dark kitchens, does not have to be located in high-end streets, because a B-location meets the operational range for sufficient clientele (Deliverect, n.d.). This could mean that society in the high streets might lose their commercial role, because of delivery-based consumption, and this will change streetscapes (Florida, Rodríguez-Pose & Storper, 2021).

Another geographic locational matter that urban planning is concerned with are the fulfilment centres (Dablanc et al., 2017). The fast deliveries needed for on-demand food delivery causes the need to have several fulfilment centres in urban locations to complete orders within the promised time-frame (Mason, 2019; Grudzien, 2020). Examples of this are platforms such as Gorilla's, Zapp, Flink and Getir. These fulfilment centres, also referred to as *dark stores*, must necessarily be located within the city boundaries, or very close, since the lead time between collection and delivery is limited. This means that the freight transport facilities, e.g., the loading and unloading locations, need to be accommodated within the city. (Dablanc et al., 2017; Mason, 2019; Grudzien, 2020). As the city becomes increasingly crowded, it poses difficulties for urban planners to create space for such facilities. An additional challenge is having to minimize the possible negative impact on city life, for example changing streetscapes, as the destination of shop premises remains unknown because of taped-shut windows, noise nuisances, air pollution or traffic congestion due to increased city distribution activities (Dablanc et al., 2017; Florida et al., 2021). However, these effects are not only a concern in relation to dark stores, but the home delivery of food, from distribution centres outside the city also

creates additional flows of traffics and pollute the city (Bates et al., 2018; Grondys, 2019; Viu-Roig & Alvarez-Palau, 2020).

Last-mile Logistics

Academic literature has devoted some of its attention to last-mile logistics and its changes with the advent of e-commerce from different perspectives, such as business and economics, sustainability and environmental, behavioural, changes and technical solutions. This background information provides insight into the aspects of last-mile logistics, and applies to the urban area and the last-mile delivery of food delivery platforms.

Firstly, academic literature on these topics is conducted in terms of business and economics motives. The last-mile delivery is considered as the highest cost driver of the e-commerce supply chain (Olsson et al., 2019). The actual amount differs in the literature, ranging from 28% of the total delivery cost to 13-75% of overall supply chain costs, which are calculated based on various factors. (Capgemini, 2018; Ranieri et al., 2018; Olsson et al., 2019; Ulmer & Streng, 2019). For instance, these costs are related to more required kilometres travelled in BC2 than B2B, because each purchase needs to be delivered to an individual address instead of a single large delivery of goods to the store (Yu et al. 2017; Ranieri et al., 2018). This increase of travelled kilometres for delivering goods is kept up or even exacerbated by home delivery. A common inefficiency in last-mile delivery is due to failed deliveries because consumers are often absent at the time of delivery at their residential address. This customer absence is particularly challenging for food delivery platforms because of the perishability and storage condition-sensitivity of food products. The waste of food lies in wait, in addition to extra journeys that need to be made, with all the associated consequences for the city, (e.g., increased traffic flows and pollution) (Pan, Giannikas, Han, Grover-Silva & Qiao, 2017; Viu-Roig & Alvarez-Palau, 2020).

Furthermore, in the literature business and economics motives, in terms of efficiency, are linked to physical features of the city. Scholars explained that performance and efficiency of last-mile delivery depends on the accessibility of addresses, the size of parcel vehicles, on appropriate stopping and parking locations, and the driver's knowledge about these (Butrina, et al., 2017; Bates et al., 2018). According to Butrina et al. (2017), the search for parking spots and illegal parking of last-mile transport contributes to the traffic congestion. This requires time and means additional pressure on

already dense roads. Providing load-unload zones, with parking facilities for pickup-delivery operations, is therefore important to include in urban planning. Bates et al. (2018) explain that the parcel vehicle size is also important in terms of road depletion and suitable stopping points. They explain that larger vehicles may have problems with pick-up-delivery operations, as these vehicles are often not suitable for entering narrow streets and car parks. Nevertheless, larger vehicles are capable of carrying or distributing heavier and bulkier items. This means that fewer vehicles are needed and that such transport is indispensable (Bates et al., 2018). The problems and solutions in play are paradoxical. Similarly, Pan's et al. (2017) suggestion that a strict delivery policy could reduce delivery failures, shows that the delivery failure is not always caused by the consumer's behaviour, as it can also be caused by delayed deliveries. Besides that, automatization plays an important role in identifying solutions for efficient last-mile logistics. The development of this can influence the dynamics of the city (Liu, Deng, Mao, Yang & Kaisar, 2020). Retailers run pilots for alternative delivery methods and vehicles for the purposes of reducing costs, as well as optimization and sustainability, in which technology plays a key role, such as in-car delivery, in-home delivery, autonomous vehicles and drones (Capgemini, 2018; Greenfield 2019; Deloitte, 2020; Liu et al., 2020).

Secondly, literature concerning sustainability and environmental matters focuses on last-mile logistics. The common use of automobile vehicles in the last-mile delivery is contributing to the depletion of road infrastructures and is closely linked to mobility challenges, for instance traffic congestion, parking scarcity and pollution (Bates et al., 2018). Parcel vehicles cause air pollution due to their CO₂ emissions, and noise pollution because of the loading and unloading in urban areas (Olsson, et al., 2019; Bjørgen et al., 2019). Freight transport inefficiency is responsible for circa a quarter of the CO₂ emissions within urban areas (Guo, Wang, Fan & Gen, 2017; Grondys, 2019). The share of last-mile food logistics in this is difficult to determine. However, market research by price comparison firm Uswitch, determined that the carbon footprint is 450% higher a year for consumers spending \$ 70 a week on take-away meals compared to those who do not order food deliveries at all (Ho, 2021). Despite the given that the carbon footprint of take-away meals is composed of various factors, last-mile delivery is one of these. In the academic literature it is explained that the efficiency potential has not yet been fully exploited and that there appears to be a low degree of consolidation compared to non-food delivery networks. The difference is because the local food distribution company delivers small

packages at high frequencies and low customer densities. As a result, mainly small trucks and vans are used there, while these consume considerable fossil fuel (Stelwagen, Slegers, de Schutter & van Leeuwen, 2021). Also, the transport and storage of food comes with additional environmental effects due to cooling systems (Pan et al., 2017; Stelwagen, 2021).

Thirdly, the literature mainly focuses on the behavioural changes caused by the transitions in last-mile logistics. Research to the adaptation of food delivery is commonly examined through case studies. In the past year, this research subject was linked to changes in urban life due to the Covid-19 pandemic. According to Chai & Yat (2019) behavioural intentions of consumers of food delivery platforms in Malaysia are driven by factors such as time saving, convenience, and privacy and safety. A study of the behavioural intentions of food delivery platforms during lockdown in Bangkok found that performance expectancy, effort expectancy, social influence, timeliness, task-technology fit, perceived trust and perceived safety significantly influenced the use of food delivery apps during the pandemic (Muangmee, Kot, Meekaewkunchorn, Kassakorn & Khalid, 2021). Earlier behavioural research focused on changes of transport behaviour as a result of e-commerce. Empirical research concludes that although e-commerce has increased freight transport, personal travel has decreased in terms of the number of shopping visits and the distance travelled by consumers (Weltevreden & Rotem-Mindali, 2009). Moreover, resulting from quantitative research among Norwegian users, home delivery of food and groceries is associated with fewer trips to physical grocery stores and reduced car use on these trips (Bjørgen et al., 2019). This shows that consumer and parcel transport circulations are influenced by the online purchases of food, which is important for urban planning. The influence of last-mile logistics on consumer behavioural patterns can be seen as reciprocal. On the one hand, the amount of travel needed to go the store is changing because the products normally purchased there are now delivered to the home, but on the other hand, the number of deliveries is increasing because more and more is bought online.

Lastly, the contribution of technological support to deal with last-mile logistics aspects has been examined in literature. Big data is used for sufficient decision-making in order to provide services demanded by the consumers. However, public administrations use this data as well in order to improve urban life. On the one hand is customer related data managed to improve e.g., the online experience, whilst on the other hand traffic

related data (e.g., traffic congestion, traffic in rush hour, route planning) is managed to improve the delivery time and such (Cagliano, Gobbato, Tadei & Perboli, 2014; Bates et al., 2018; Deloitte, 2020). For example, customer satisfaction is bolstered by new communication technology and methods are improving to enhance the customer experience. Examples are chatbots, or requests for rating the customers experience, including notifying customers about the estimated delivery time (Ho & Zheng, 2004; Capgemini, 2018; Patella, Grazieschi, Gatta, Marcucci & Carrese, 2021). In addition, the use of traffic related data shows that big-data technology enables users, which in the present case are food delivery platforms, to interactively exploit a number of data sources in order to manage transportation operations more efficiently (Cagliano et al., 2014). For instance, navigation technologies supported the efficient deliverers (Bates et al., 2018). Building on this, blockchain geolocation and traceability services enhance the route and real estimated delivery times (Deloitte, 2020). Moreover, insights about pollution, environmental externalities, road use, and congestion are mapped by technology (Bates et al., 2018). The data on traffic, routes and delivery times is also important information for authorities with regard to designing the city, providing efficiency and accessibility, and improving the liveability and sustainability. Improving these technologies might enable both public and private parties to optimize their current activities.

City Planning

Despite the fact that incorporating logistics in urban planning is relatively new, different approaches of logistics in urban planning are described in the literature. Although logistics and mobility are related, with regard to urban planning it is important to make a distinction between the two. Transport activities, in terms of logistics, provide the supply to cities, while mobility represents the transportation of the city's users (Olsson, et al., 2019). Although logistics uses the city's infrastructures for supplying the city, the difference is the operational chain behind the logistics, in which transport is an element (Olsson, et al., 2019). A common academic approach is to look at the last-mile (McKinnon, et al., 2015; Gonzalez-Feliu, 2018; Cardenas et al., 2017). In urban planning, logistics can be considered as a set of flows which are larger than those of the last-mile. In particular, transport flows of goods to the point of consumption relate to the management of the city (McKinnon, et al., 2015; Gonzalez-Feliu, 2018). The flows of the city are sometimes referred to in the literature in a rather broad sense. Many scholars have adopted the

following definition of *City Logistics* to make clear how logistics is interwoven with the city: “The process for totally optimizing the logistics and transport activities by private companies with support of advanced information systems in urban areas considering the traffic environment, the traffic congestion, the traffic safety and the energy savings within the framework of a market economy” (Taniguchi et al., 2001). Optimisation of these different traffic aspects will include challenges such as urbanization and environmental matters, which are complexified by the developments of e-commerce and platforms in the city.

A recent approach on city logistics and urban planning is aiming for a broader lens by taking the equality of stakeholders into account, besides the relations between different stakeholders (Gonzalez-Feliu, 2018; Viu-Roig & Alvarez-Palau, 2020). Often, the same private logistics actors operate regularly in the same cities, but do so without any meaningful dialogue with the urban authorities. When given the opportunity, operators and shippers often prefer to work with city authorities in order to identify problems and implement solutions. After all, inefficient operations are expensive. However, long-term solutions for urban logistics can only be achieved through cooperation and understanding between the stakeholders, and this goes beyond the actions of private logistics operators only. Therefore, the different stakeholders must be unambiguously involved in assimilating sustainable practices as well as minimising the gap between their own unique perspectives and interests (EC, 2013; Butrina, et al., 2017; Gonzalez-Feliu, 2018; Viu-Roig & Alvarez-Palau, 2020).

Besides this lack of coordination between urban logistics actors, the European Commission (2013) raises two other challenges for city logistics in planning; the lack of focus and strategy on urban logistics and the lack of data and information. Most cities do not have a well-developed and comprehensive urban logistics strategy in place yet. Attention and resources are focused on passenger transport and there is a fairly minimal recognition for the contribution that city logistics makes to the city economy. For example, just a few cities have an official with the authority to be responsible for urban logistics (EC, 2013). Also, the potential to collaborate with stakeholders to improve the city logistics efficiency, reduce costs and negative impacts is not being exploited (EC, 2013). Furthermore, getting a grip on city logistics is challenging, due to a lack of information and insight into the goods flows. More insight into issues such as: ‘*What is being moved, where, when, by whom and by what means?*’, is important for improving the urban

economy. On the other hand, there is also a lack of readily available and useful information for urban transporters. This pertains to information related to the city's logistics policy, regulations and services for example. To tackle these issues, the European Commission (2013) suggests a long-thought-out and stable-term vision, that focuses on various aspects of the aforementioned issues such as reducing costs, improving air quality, safety or the reduction of greenhouse gas emissions. The focus on opportunities and solutions depends on the context of the city. In order to work as effectively as possible, it is important to integrate this specific policy into other parts of urban policy. In addition, meeting the need for more transparency and information for all actors is important. Improving operational efficiency and long-term planning is only possible by using good data. The new, more cost-effective ICT technologies can play a role in this. Sharing information on routes, restrictions, parking and alternative solutions and administrative procedures can facilitate access to urban areas, thereby improving freight delivery efficiency (EC, 2013).

2.3 Conceptual framework

The academic literature has focused on platforms as a new type of capitalist model, harvesting data and reforming labour. Such models performing in urban areas is determined, however less research is done on looking at the platforms affecting the urban area. In addition, municipal discussions or analyses of these issues is falling behind. The rapid emergence of food delivery services shows the entanglement of urban life and the new capitalist models. The home delivery of food through platforms raised concerns (such as road safety, the existence of physical establishments, the change in streetscapes, freight transport facilities, and environmental matters). In terms of urban planning the last-mile of food delivery platforms affects the city. The knowledge to regulate the new consumer practices and logistical operations as new stakeholders of the city is yet to be developed. Encountering these knowledge gaps is becoming more accurate as the pandemic has accelerated the platformised food delivery services in urban areas, the policies are lagging behind, and this urban challenge is in addition to existing urbanisation and climate changes the city faces.

In order to research the last-mile of food delivery platforms, in relation to the planning of the city, this study is carried out through assemblage thinking, based on the concept of McFarlane (2010) and relates to the Actor Network Theory. Assemblage

thinking and actor network theory have parallels in assuming relationships between human and non-human entities, new actors and new ways of acting. These concepts consider paradigm shifts, in which spatiality is seen as the result of the union of entities. The shifts are seen as opportunities to rethink the relations between power, politics and space from a more process-oriented, socio-material perspective (Müller, 2015). Using this as a conceptual framework is appropriate for this study because both actors and agents (i.e., human and non-human entities) are taken into account to determine relationships and their meaning for the city and for planning. In accordance with the concept of platform urbanism, McFarlane (2010) considers the city as a process to understand the spatiality of the city, which can be seen as processual, relational, mobile and as inequality. With platform urbanism as the guiding concept, food delivery platforms should be viewed in a broader sense than just as economic actors operating in the city. The platforms' manifestation in cities is equivalent to *'a process of integration and connection of elements, where the connections and their arrangement provide context for assigned meanings'* (Bissell, 2020; Richardson, 2020a; WP Phillips, 2006). Beyond that, platforms integrate both human and non-human networks into the city as processes which affect more than just the spatial dimensions. In the literature this is expressed by socio-spatiality concerns (e.g., road safety, increase in transport, changes in streetscapes) (Dabanc et al., 2017; Griesbach et al., 2019; Richardson, 2020b; Bissell, 2020; Florida, Rodríguez-Pose & Storper, 2021). The third point in the conceptualisation of assemblage thinking, as proposed by McFarlane (2010), is the structuring and hierarchy of urban assemblages. Platforms influence practices, logistic patterns and access to cities through data access. Lack of transparency, due to fear of competition, lack of equal access to urban services, and lack of (logistical) facilities can cause imbalances in the established order. These concerns make it clear that structuring the city is not only determined by the local government's regulations. The local government's tasks entail maintaining balance in the city. However, when appropriate regulations are lagging behind, and if knowledge is not caught up, this distribution of power, in terms of structuring the city, can take another route.

Based on the above, McFarlane's (2010) conceptualisation is suitable for answering the question of: *'What does the rise of last-mile food delivery platforms mean for the city and urban planning?'*, and can contribute to urban planning literature, by looking

into the reshapes of the city caused by food delivery platforms and the consequences which local government should take into account with regard to planning the city.

3. Methodology

This chapter discusses the methods used to carry out this research. First it will be explained for what reasons a case study approach is appropriate and which research area is chosen. Thereafter, a more detailed insight about the used methods for the data collection is given. Finally, the quality of this study is justified in this chapter.

3.1 Research method

Flyvbjerg (2006, p. 26 - 27) stated that *“Good social science is problem-driven and not methodology-driven, in the sense that it employs those methods which for a given problematic best help answer the research questions at hand”*. With that in mind appropriate research is designed to answer the central question: *‘What does the rise of last-mile food delivery platforms mean for the city and urban planning?’*, which is a case study design containing mixed-methods. For a case study design, the preference is often given to qualitative methods, because these contribute to an intensive and detailed investigation of a case (Bryman, 2016, p. 68). The combination of both quantitative and qualitative research is used for this study (Flyvbjerg, 2006, p. 27). Despite the epistemological commitments for both qualitative and quantitative research, these methods can be used for a wide variety of tasks and these are mutually illuminating (Bryman, 2016, p. 629).

In this study, the mixed-methods are viewed as being compatible and equal. The online questionnaire aims to bring out the citizen-consumer practices and experiences, whilst the semi-structured interviews focus on in-depth information about logistic operations and government responses in terms of regulations and policies with regard to food delivery platforms in Amsterdam. As different stakeholder groups are the target audiences of both methods, insights about different operations, practices, perspectives, interests, concerns, challenges are being sought. In that way a broader perspective can be formed to critically look into tensions and the opportunities that arise.

3.2 Case study

Bryman (2016, p. 66) describes case study research as the detailed and intensive analysis of a single case. Using the term ‘case’ commonly suggests a case study with a location which applies to this study (Bryman, 2016). Conducting a case study has advantages and

disadvantages. For instance, in-depth details can often be obtained more easily with case studies than with other methods. In addition, this often relates to unique cases and previous hypotheses can therefore be revised. Despite the aforementioned advantages, the concept of a case study has been criticised. Collected data may not necessarily be generalised to include the wider population, thereby decreasing its relevance (Yin, 2009). However, generalization is a practical skill needed for carrying out scientific work and for contributing to gaining knowledge (Flyvbjerg, 2006, p. 10). Furthermore, there is a chance of bias because as one researcher collects the data in one case only (Yin, 2009; Bryman, 2016). In response to that, Flyvbjerg (2006, p. 21) stated that: *“The case study contains no greater bias toward verification of the researcher’s preconceived notions than other methods of inquiry. On the contrary, experience indicates that the case study contains a greater bias toward falsification of preconceived notions than toward verification”*. Also, due to inexperience, a correct design of the study cannot be created and there is a chance that the research question will change during the collection and analysis of data. To prevent the latter, Yin (2009) distinguishes 4 types of design; holistic single case designs, holistic multiple-case designs, embedded single case designs and embedded multiple-case designs.

For this study a holistic multiple-case approach, in which no distinction is made between different sub-units and the social phenomenon as a whole is analysed, is appropriate. Despite the given that this study is focused on a single location, research is performed among different stakeholders with various interests. Therefore, this can be considered to be consistent of sub-units.

3.2.1 Selection of the case study

The research material used for this research is the case study of B2C food delivery platforms in the city of Amsterdam. The following substantiates why B2C food delivery services in Amsterdam is an appropriate subject for a case study: the city of Amsterdam is an interesting case to look into more in-depth because the overall on-demand food delivery market in the Netherlands is rapidly growing, and new food delivery platforms emerge in Amsterdam. As mentioned earlier, concerns have been raised amongst the members of Amsterdam’s city council (Ijmker, 2021). The Netherlands became the largest online grocery purchaser of the European Union in 2017 (Ecommerce News, 2018). The Dutch online grocery market is expected to grow with at least 9 percent between 2018

and 2023 (CBS, 2018; Ecommerce News, 2018). These growth expectations are based on the last decade but exclude the consequences of the Covid-19 pandemic. As research shows, this pandemic has had a great influence on the food delivery market worldwide (Williams et al., 2020; Research and Markets, 2020). Despite the mandatory closure of restaurants, due to the pandemic safety measures taken, the overall turnover of the Dutch food sector in the fourth quarter of 2020 was 7.3 percent higher than in the previous year, and in the third quarter it grew by 6.4 percent (CBS, 2021a).

Looking at Amsterdam's last-mile delivery as the Dutch example is basically a unique case. The Dutch are known for their daily bicycle use and therefore bicycles logically became an important means of transport for the last-mile delivery of food delivery platforms in Amsterdam. Where many foreign authorities focus on promoting alternative low emission's transport, such as bicycles, Amsterdam is a precursor to this phenomenon through its prevailing culture (Schepers, et al., 2017). Mobility issues that must be considered consist of the increasing pressure on motorways and on bicycle paths. In addition, pressure on public space, by the increase in food delivery platforms in Amsterdam, is also visible in the pavements which are nowadays filled with delivery bikes, bike delivery drivers waiting in the street for their orders or taped-shut windows of dark stores that function as distribution centres. For those reasons, members of the city council of Amsterdam express their concern about the negative effects with regard to the flash deliveries done using bicycles. Arguments for the aforementioned motion relate to road safety concerns, attractiveness and liveability (IJmker, 2021).

The food delivery market in Amsterdam proves to be an interesting case because the city faces urban sprawl and has committed itself to actions on climate change, challenges in which last-mile logistics plays its part. The population density of Amsterdam will increase from the current 5,100 residents to 5,700 residents per square kilometre in 2030. Besides the residential growth, the increase of jobs and in tourism leads to an increase in transportation in the city and in the surrounding areas of Amsterdam (Gemeente Amsterdam, 2020). As a member of the C40 Cities Climate Leadership Group (C40), Amsterdam aims to attain a low-carbon economy. Along the C40 membership, international agreements signed by the Netherlands, have stimulated the municipality of Amsterdam to implement policies to reduce CO₂ emissions by 48% by 2030 (Gemeente Amsterdam, n.d., a). To achieve this, various departments have been committed to contribute to this goal. Despite the fact that in Amsterdam most of the CO₂ emissions are

currently caused by electricity consumption and by the natural gas and heat consumption of buildings, the external effects of mobility and transport should not be underestimated. Since 2021, the municipality adopted environmental zones for transport in the city, which set restrictions on certain types of vehicles that enter these zones (Rijksoverheid, n.d.; Gemeente Amsterdam, 2009; Gemeente Amsterdam, 2019a; Gemeente Amsterdam, 2020b). These measures affect the logistics operations of food delivery platforms in Amsterdam.

Lastly, Amsterdam considers itself to be a Smart City. The Amsterdam Economic Board steers the values of the Amsterdam Smart City concept by working on '*the smart, green and healthy future of the Amsterdam Metropolitan Area*'. This is done by cooperation based on private-public partnerships within the region. The focus is platform and community based, which entails a way of working together by sharing knowledge and innovations (Amsterdam Smart. City, n.d.).

3.2.2 Research area

Amsterdam is capital of the Netherlands and is located in the province of North-Holland. The city is part of the Randstad area which is a sprawling urban area in which the four largest cities are interconnected, but whereby each city retains its own centre. Figure 2 shows the location of Amsterdam within this area. The research area of this study includes the build environment within the municipal boundaries of Amsterdam. The area shown in figure 3 is qualified as the research area because the last-mile delivery of the food delivery platforms takes place in this area, and regulations regarding carbon reduction apply to this area.

Figure 2: Randstad area



Source: Google maps (2021)

Figure 3: Research area



Source: Google maps (2021)

3.3 Data collection

Data collection aims to answer the sub-questions: *'What platformised modes of last-mile food delivery are emerging in the city?'*, *'How is the city responding to the last-mile logistics of the rising food delivery platforms?'*, and *'What tensions and opportunities are associated with the rise of last-mile food delivery platforms in the city?'*. The methods for data collection mainly refer to the gathering of policy documents and reports, interviews with food delivery platforms and last-mile delivery operators, public policymakers, and includes a comparison based on a web review and surveys amongst the citizens of Amsterdam.

Collecting data by a qualitative document analysis entails the systematic procedure for reviewing or evaluating documents (Bowen, 2009; Altheide et al., 2010). Traditional quantitative analysis methods emphasize quantities, while qualitative document analysis looks at descriptions and contexts, seeking underlying patterns of meaning and processes (Bowen, 2009; Altheide et al., 2010). The purpose of an in-depth or semi-structured interview method is to obtain detailed information. This method is chosen for this study as to allow participants the freedom to mention other issues and for the researcher this provides the opportunity to cover crucial points (Bogner & Menz, 2009; Bryman, 2016). A comparative analysis provides knowledge about the operational context by means of a systematic way of studying features of cases (i.e., food delivery platforms) (Collier, 1993). The qualitative method, in this case an online survey, is a popular data-collection method to generalise data from a given group to conclude what, for example, certain ratings, behaviours or expectations are (Bryman, 2016). By using this method information about practices, experiences and future expectations of citizen-consumers can be obtained.

3.3.1 Document analysis

The document analysis aims at finding out how the municipality responds to the food delivery platforms in order to answer the second sub-question. The aim was to find out what measures affect the last-mile logistics of food delivery platforms. However, by looking at the current policy, it was found that the municipality had not formed a policy on this. In addition, this analysis strengthened the interviews guide. Private stakeholders, in particular, could be asked how they deal with specific measures whereas the

municipality could be asked about the rationale behind the measures taken. This led to exhaustive conversations.

The document analysis consisted of policy documents, reports from government research institutions, and the content of government websites. To ensure a broad coverage, both Dutch and English sources were included in this study. During the content analysis process, the content was categorised according to the requirements of the second research question and, during the thematic analysis, the data from the documents was categorised (Bowen, 2009). The document analysis consists of two steps. First, relevant policy documents were collected by sorting the public documents published by the municipality into various categories: Environment and Climate, Mobility and Traffic, Transport and Logistics. Table 2 shows which policy documents were collected and analysed. Then, the documents were analysed by using the program NVivo to clarify which policies relate to last-mile logistics. In appendix 2 the coding book has been added.

Table 2: Analysed policy documents

	Document	Publication date
1.	Draaiboek Uitvoering Milieuzone 2009	October 9, 2009
2.	Uitvoeringsagenda Mobiliteit	September 30, 2015
3.	Meerjarenplan Verkeersveiligheid	September 14, 2016
4.	Actieplan Schone Lucht	October 1, 2019
5.	Actieplan Bruggen en Kademuren	July 2, 2019
6.	Agenda Amsterdam Autoluw	January 23, 2020
7.	Routekaart Amsterdam Klimaatneutraal 2050	March 3, 2020
8.	Raadsbrief Logistieke strategie	May 18, 2021
9.	Omgevingsvisie Amsterdam 2050	July 8, 2021

3.3.2 Semi-structured interviews

The semi-structured interviews focused on gathering data about the operations of food delivery platforms and last-mile delivery in Amsterdam, interpreting the policies concerning regulating mobility and logistics, and possible solutions for the implementation of last-mile logistics in urban planning. This contributes to answering first and second sub-question. Interviews were held in advance as to provide knowledge of the impact of last-mile delivery of food delivery platforms on the city from different

stakeholder perspectives. During the preparation of the interview guides, the questions concerning the impact were clarified by making a distinction between the impact of physical elements and social elements of the city (e.g., the pressure on roads and bicycle paths and the threat to the existence of physical restaurants). In addition, the interviews with public officials provided information about the relationships between the various departments within the municipality, and the view of government involvement in the logistics sector. The interviews with private stakeholders made clear which features of logistical operations are used for the last-mile, and which developments are currently taking place in this regard.

A semi-structured interview guide has been drawn up containing general topics and questions, but sufficient space was reserved during the interviews to discuss the information provided by the participants. Specific questions were formulated depending on the role of the stakeholders. In appendix 3 an example of an interview, which contains specific questions for a certain stakeholder, is shown. The structure of the main themes chosen allowed the interviewer to steer the interview be more or less if the participant elaborated too much on certain topics (Plochg & Van Zwieten, 2007; Saunders, Lewis, Thornhill, Booij & Verckens, 2011).

The participants for the interviews are stakeholders with knowledge about city logistics and policies and operators in home food delivery or last-mile delivery. The selection of participants is based on a theoretical sampling method, which means that the researcher has a reasonable suspicion that respondents can make a potential contribution to the data collection and the analysis of the research results (Scheepers, Tobi & Boeije, 2016). Interviews with city authority officials enhances knowledge about the decision-making and policies there. Interviews with stakeholders who operate in on-demand food delivery and stakeholders specialised in last-mile delivery enhances the knowledge about the strategies and growth potential of this market. A total of 8 stakeholders have been interviewed. With regard to the privacy of the participants, the general information about them is not made publicly known. In table 3 the variety of institutions and their corresponding expertise are presented.

Table 3: Participants semi-structured interview

Stakeholder type and number	Institution or company	Function or expertise	Date
Government			
1.	Municipality of Amsterdam	Chief Technology Office (CTO) Innovation team	July 21, 2021
2.	Municipality of Amsterdam	Consultant area-oriented approach to Logistics	July 15, 2021
3.	Mobility Region Amsterdam	Network Director Logistics	April 30, 2021
Private parties			
4.	Het Wijnhuisje	Co-Founder	July 22, 2021
5.	Kitchen in the Skies	Co-Founder	June 24, 2021
6.	Local Heroes	Head of Operations	April 29, 2021
7.	Trunkrs	Team Lead Sustainable Deliveries	June 10, 2021
Knowledge institutions			
8.	Amsterdam University of Applied Sciences	Professor in City Logistics specialised in i.e. Food Logistics	July 7, 2021

According to Doorewaard & Verschuren (2007) body language is important for the interpretation of certain statements. However, due to the on-going Covid-19 pandemic the interviews could not be performed face-to-face. In order to allow the semi-structured interviews to take place in the best possible way as well as to enable the needed interpretation of body language, it was decided to conduct interviews via video conversations. For six respondents this did not pose a problem, however, due to technical inconveniences and availability, two interviews had to be conducted by telephone. The interviews lasted half an hour on average and were conducted separately. The latter is to avoid getting socially desirable answers (Baarda et al., 2013). All interviews were conducted in Dutch. The interviews were subsequently translated into English by the researcher in order to use the interview contents in the research. The translation may have led to nuances that might be missing due to this rendering of the content.

The data analysis for qualitative research started with a short summery made straight after every interview. The second step in analysing the interviews has been

transcribing the audio and video recordings of the interviews. Thereafter, the analysis tool NVivo was used. This makes it easier to combine statements from the various interviewees and analyse the relationships and connections. The code book used has been added in appendix 1.

3.3.3 Mapping

Based on a web review the Amsterdam food delivery platforms have been mapped in terms of a comparative analysis. This method was carried out to answer the first sub-question. A simplification of this analysis has been added as a comparative table in appendix 3. It is important to be critical of the quality of web information and ensuring the adequacy of data is required (Knight & Burn, 2005). The data to map the operators in Amsterdam is appropriate as it consists of information that describes the features of logistic strategies (i.e., operational scales, distribution centre locations, logistic network models, transport modes, delivery times, and relationship with consumers). This descriptive data is reliable because the food delivery operators have shared this on their platform, and it can therefore be assumed that this is implemented in practice. The food delivery platforms were reviewed on the basis of the parameters required to give specific answers to, as well as to maintain the direction of this study. The different parameters came from the theory about the different on-demand food delivery providers and their operational strategies, impacts of e-commerce and e-commerce supply chains and the reported challenges for both operators and public administrations. Besides the above, the companies' size and years of establishment have been investigated. Since online platforms for food delivery are rapidly emerging, it is possible that new operators emerged during the completion of this study. The mapping exercise has been performed between April 15th and June 24th 2021.

3.3.4 Online survey

Quantitative research, by means of a survey will be used to answer the second sub-question as well as to gain insight about how the citizen-consumers of Amsterdam experience the impact of food delivery on spatial features of the city and what their practices are in the different food delivery categories; groceries, meal boxes and take-away meals. Because of the Covid-19 pandemic, the survey could not be performed face-to-face and was therefore only available online. The presence of the researcher can be

advantageous for the quality of the data, because the questions asked in the interviews can be further explained when a respondent is not sure by what is meant by the question. However, the researcher's physical presence could also be disadvantageous, because the respondent's response behaviour can be influenced by the bias of the researcher (Schröder, 2016). The survey was made available in both the Dutch and English languages.

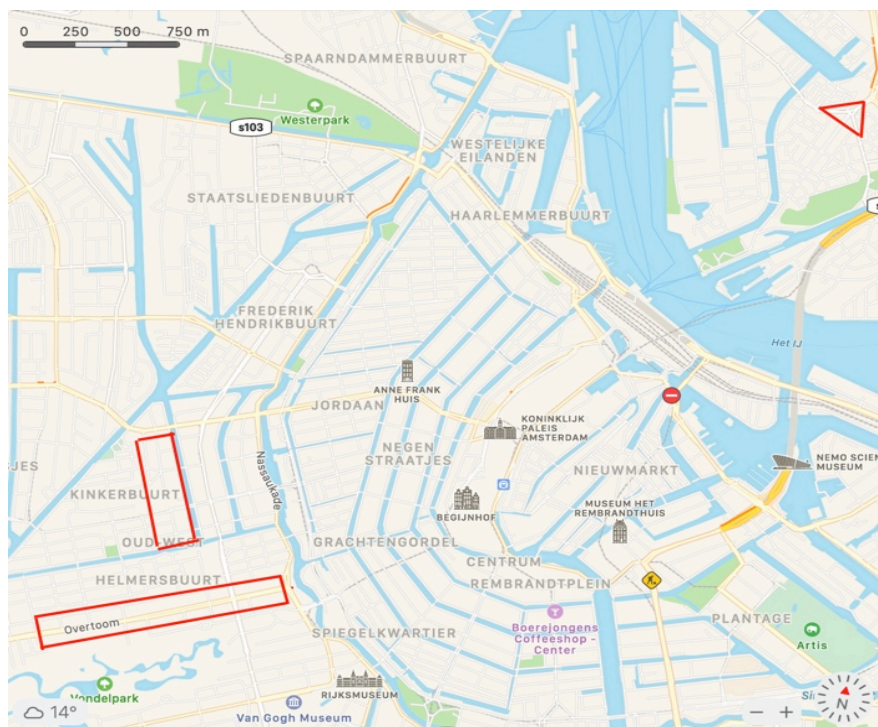
The survey conducted is based on concepts found during the literature review. The first section consists of general questions, whereas in the second section questions are concerned with the usages of food delivery platforms by the respondent. The third part consists of questions about future expectations on the participant's online food ordering behaviour. The last section is about the participant's experiences with food delivery in the city, and how this affects the urban area. The survey consists of statements, multiple-choice questions, and open questions. The statements have been drawn using a 7-point Likert scale, ranging from -3 (most unimportant) to +3 (most important). The open questions aim to find out the underlying thoughts on the experience respondents have. The English version of the survey is attached in appendix 3.

The requirements for the survey participants were that they would have a minimum age of 18 years, and that they were living in the Amsterdam postal code areas 1000 t/m 1109, which is the research area covered. Based on this, the population group is 725.175 being the number of residents of Amsterdam (CBS, 2021b). By population the number of 'units' or the same group is meant, which complies with the requirements for the survey (Bryman, 2016, p. 187). Based on a sample size calculator for multiple regression, a minimum sample size of 76 is required for this research (Soper, 2021). By a sample a portion of a population is meant (Etikan et al., 2016). The calculator used is based on empirical research and calculates the minimum required sample size for a multiple regression study and is based on the desired probability level, the number of predictors in the model, the anticipated effect size, and the desired statistical power level (Soper, 2021).

Respondents were gathered using a combination of the convenient- and snowball method (Etikan et al., 2016). This study is limited financially, and, due to the Covid-19 measures, these are reasons which led the researcher to use nonprobability sampling. The latter means that samples are gathered while not all participants or units in the population have had an equal chance of being included (Etikan et al., 2016). The survey

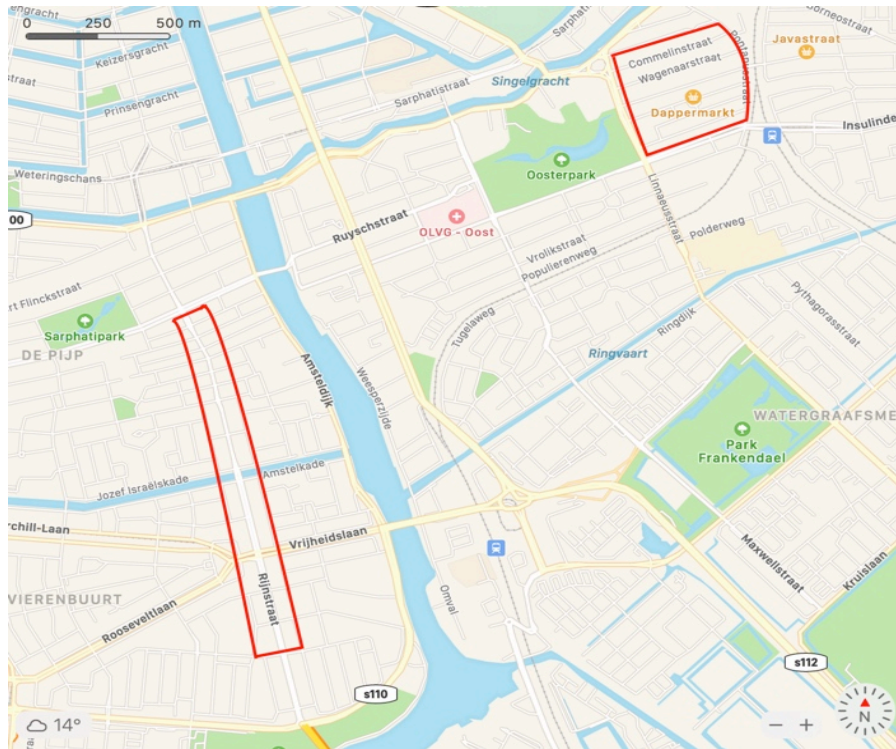
was conducted online, and the distribution took place by reaching out to the researcher's LinkedIn, Instagram and WhatsApp networks. To enhance the equal probability of participants being selected, also known as probability sampling, flyers with a QR-code (appendix 4) which leads to the survey's hyperlink were handed out in different areas of the city (as shown figures 4 and 5) (Etikan et al., 2016). Handing out the QR-code was carried out fully respecting the Covid-19 measures place. This was done in four different areas on Saturdays, between 10 am and 12 noon, during the period June 12th till July 3rd 2021. These areas are seen as an appropriate selection because these are shopping areas which are crowded on Saturdays, and are commonly visited by people living in the surrounding areas but are not necessarily tourist attractions or have shops that focus on tourism. In Amsterdam-West, two areas have been incorporated because only a limited number of people was willing to accept the flyer. The first completed survey was received by the researcher on June 7, 2021 and the last one on July 27, 2021.

Figure 4: QR-codes distributed in Amsterdam's western and northern areas



Source: *Apple Maps* (2021)

Figure 5: QR-codes distributed in Amsterdam's eastern and southern areas



Source: *Apple Maps* (2021)

3.3.4 Ethics and privacy

The ethics of this study first has to ensure that the participants are aware of the use of their answers by the researcher, and what led to this particular participant being selected as a data source. During this research, these points were clarified both in previous e-mail contacts with the participant as well as at the start of the interview. In addition, the participants were asked whether they had any objections to the recording of the interview and the use of quotations. None of the participants objected to this. After the completion of the study, the participants will be informed about the results of this by e-mail. Participations have information privacy and participants have the right to be informed about the nature of the research, as Bhattacharjee (2012) points out. Also, Bhattacharjee highlights that response rates might be increased if the identity of the participant is kept confidential (Bhattacharjee, 2012). With regard to the interviews, none of participants objected to the use of their names. However, this study will refer to them by their institution or company name and expertise or function. This means that their privacy will be ensured. With regard to the survey, participants answered this anonymously.

3.4 Quality of research

In order to ensure quality, this section explains the reliability and validity of this research. This is done by substantiating the internal and external reliability and internal and external validity. These are closely related, as a valid study means that the selected method actually measures what was intended to be measured, and the precision with regard to that measurement shows the reliability of the study. A reliable study means that repeating the study yields the same results (Bryman, 2016).

3.4.1 Reliability

The degree of internal reliability depends on the consistency of the various researchers by checking to what extent the views and observations are aligned (LeCompte & Goetz, 1982). This is ensured as only one researcher has conducted this research. The external reliability of a study indicates the extent to which it is possible to obtain identical study results when the study is repeated (LeCompte & Goetz, 1982). It is difficult to repeat the research under the exact same research circumstances, however the description and justification of the research process can be explained carefully to facilitate the reproduction of the research (Boeije, Hart & Hox, 2009). The external reliability of this research is assured because this research can be replicated through an extensive and careful explanation of the research processes.

3.4.2 Validity

Validity is distinguished here into internal and external validity. The degree of internal validity has to do with causal relationships between the research results and the generalisability of the research results is referred to as the external validity (LeCompte & Goetz, 1982; Bryman, 2016). Generalisability is seen as problematic in qualitative research, because specific cases and specific examples are used (LeCompte & Goetz, 1982; Bryman, 2016). The internal validity in this research is increased by minimising systematic errors through triangulation. The external validity of this research cannot be guaranteed because only a single case study is used. Replicating this study in a different context may therefore lead to different results.

4. Results

The role of the food delivery platforms in the city is characterised by a complex structure which is interwoven with the offering of different services by platforms, the behaviour of consumer-citizens, the need for supplying the city, and the logistical challenges that are influenced by these aspects as legal frameworks as well. In order for the structures to work in the best possible way, and for reducing negative consequences, it is important to understand the structure. In Amsterdam, the daily urban freight transport accounts for 15% of all traffic, by means of the daily use of 30.000 delivery vans and 4.000 trucks, and these numbers are expected grow in the upcoming years. This transport is needed to supply the city, but impacts the city because of environmental, safety and infrastructural matters (De Vries, 2021). City logistics are causing emissions of nitrogen oxide, particulate matter, soot and CO₂, and Amsterdam's citizens experience nuisance and a sense of unsafety because of the trucks and delivery vans in the city. In addition, the city's infrastructure is challenged because bridges and quay walls are subject to additional stress, due to heavy traffic and the storage of building materials on the quays (Gemeente Amsterdam, 2020a).

The amount of traffic and its negative external effects for which the food delivery platforms are particularly accountable for is not clear. However, new initiatives of on-demand food delivery platforms are emerging rapidly. Amsterdam has to deal with about 29 market players (appendix 2) which are delivering groceries and alcohol, meal boxes, and takeaway meals all across the city. All these players perform a last-mile delivery, which is accompanied by different kinds of delivery times, scales of operations and transport modes based on covering the addresses and routes, and the distribution or warehouse locations. Because of this, the market players experience different logistical challenges, and the (local) government has to deal with various environmental, economic and social challenges whereas the citizen-consumers experience advantages and disadvantages.

With a view to the densification of the city, these aspects will only become more complex. As city logistics has not been a common subject included in Amsterdam's urban planning for years, this complexity is already present. The reason to exclude logistics in planning previously was because logistics were taken care of by the companies themselves and was not considered to be a public task. However, since a few years, the

municipality of Amsterdam is including city logistics into planning issues as the impact of logistics on the city is considered to be a public responsibility as well (Mobility Region Amsterdam, personal communication, April 30, 2021; Amsterdam University of Applied Sciences, personal communication, July 7, 2021; Municipality of Amsterdam, personal communication, July 15, 2021). However, the interpretation of the facilitating role of the government is a complex issue, because of the question where the government should intervene to keep the city liveable? And where should the government facilitate to increase the supply of the city according to the wishes of entrepreneurs and consumers?

The aim of this chapter is to better understand how B2C food delivery takes place in Amsterdam and what this means for planning the city. The aspects regarding the operation of different food delivery platforms in Amsterdam are explained and compared first. Thereafter, the response of Amsterdam to the emerging food delivery platforms is illustrated. This is done by looking at the local government's response by drawing up policies and in-depth interview answers, and by looking at the citizens-consumer's response by explaining outcomes of the survey. Finally, these analyses have led to insights about tensions and opportunities within urban planning.

4.1 Food delivery in Amsterdam

The rapid growth of food delivery platforms in Amsterdam began with the online sales of weekly groceries by large supermarket chains. Albert Heijn launched the first Dutch grocery webstore as a smartphone-app in 2009, and became the market leader of the Dutch online grocery market in 2020 (Albert Heijn, n.d.; Distrifood, 2020). Competitors, both existing grocery retail groups as well as new e-commerce players, were stimulated by the 2009 launch to enter the online grocery market. The Dutch e-commerce company Picnic launched a smartphone-app for the home-delivery in 2015 which has shaken up the online grocery delivery market. Picnic has grown from just providing to 1,7% of households (in 2017) to player that provides to a quarter (in 2020) of tall Dutch households (Distrifood, 2017; Distrifood, 2020). Moreover, in 2020 more than 200.000 people were on the company's waiting list (Van Gestel, 2020). Picnic operates since 2018 in Amsterdam. A comparable Dutch platform named Crisp was launched in 2018. Crisp managed to its turnover in 2020 more than sevenfold. Over 85% the sales comes from returning customers. Among these there are many people who first tried Crisp during the first lockdown, and half of the company's regular customers come from the Randstad area

(deondernemer.nl). The Amsterdam platform Local Heroes saw the pandemic as an opportunity to go live in March 2020, instead of their original plan of launching in the spring of that year. Local Heroes aims to give the Ten Kate market in Amsterdam-West a tool to participate in the grocery industry competition by joining forces and by offering pick-up and delivery services (Local Heroes, personal communication, April 29, 2021). In the 2020 spring, Het Wijnhuisje entered the Amsterdam food delivery market by offering home delivery of wines all across the city (Het Wijnhuisje, personal communication, July 22, 2021). A year later around spring, flash grocery delivery was introduced by the German Gorilla's company. Flink (German), Getir (Turkish), and Zapp (British) followed quickly within four months (Wolters, 2021). Other food delivery platforms in Amsterdam are platforms offering home delivery of subscription-based meal boxes, with recipes and the accompanying fresh ingredients. Based on the early founding years, the market has been expanding for 10 years. Dutch platforms are De Krat (founded in 2010), Boerschappen (founded in 2013), Eko Menu (founded in 2016), and Familiebox (founded in 2015) (De Krat, n.d.; Boerschappen, n.d.; Eko Menu n.d.; Familiebox, n.d.). International platforms are two German companies namely Hello Fresh (founded in 2011) and Marley Spoon (founded in 2014), and the North-American company Dinnerly (founded in 2017) (Li, 2014; Loritz, 2018; Dinnerly, n.d.). Furthermore, the delivery market that food delivery at home initially started with is the take-away meal delivery. In Amsterdam different operators have emerged. The competition has increased particularly in the last ten years. Thuisbezorgd.nl (founded in 2000) has grown since 2015, both through organic growth and acquisitions of the British company Deliveroo (founded in 2013), the North American company UberEats (founded in 2014) and the Ukrainian company Rocket (founded in 2018) (Rocket, n.d.; Wright, 2017; Sassard, 2017; Sillars, 2020). A similar platform which is not live yet, but soon will be, is the Estonian company Bolt Food. Bolt is competing with the services of Uber as they started with taxi services as well and are expanding the taxi services with food delivery (Kitchen in the Skies, personal communication, Jun 24, 2021).

The different platforms in Amsterdam are compared based on their operational methods. This section highlights the key results of this comparison. The platforms are further categorised based on their e-commerce business models, and on their product focus and features. The main categories compared are Bricks and Clicks, Pure-play E-tailers and Local initiatives, and the sub-categories are the weekly or daily groceries,

subscription-based or non-subscription-based meal boxes, and take-away meals. To better understand what these operational methods mean for the city, the logistic network models (LNMs), the scale of operations, the distribution centres or warehouse locations, the delivery timeframes, the modes of transport, and the relationship with the citizen-consumer are compared. In appendix 3 a schematic overview is given of this comparison.

Logistic Network Model (LNM)

The dominant strategy for food delivery platforms is the self-supporting model. Operators shape their own last-mile logistics depending on their product and services features. Based on the qualitative data, Picnic is a front-runner in last-mile logistics (Mobility Region Amsterdam, personal communication, April 30, 2021; Trunkrs, personal communication, June 10, 2021; Amsterdam University of Applied Sciences, personal communication, July 7, 2021; Municipality of Amsterdam, personal communication, July 15, 2021). Picnic prioritises the efficiency of the delivery routes and the deployment of transport comparing these to the customer's wishes for a specific delivery time or day. The Picnic customer places an order and chooses from a selection of delivery days whereby only one timeslot for each delivery day is shown. The reason for this is that the delivery drivers only drive through a neighbourhood once a day at one time. Picnic retains the power for delivery more or less to themselves in order to plan routes more efficiently and be more sustainable. In comparison to the delivery activities of Bricks and Clicks operators, where the customers can choose every day of the week and multiple time slots on the day for delivery, this is seemingly somewhat restricted. On the one hand, the Bricks and Clicks offering is very customer-friendly, but it does mean that route planning becomes a complicated matter and it increases transport circulations in the city. Both platform categories stimulate customers to order weekly groceries by offering free delivery in exchange for a minimum spending amount (Van Asseldonk, 2017; Van Beek, 2020). This is a smart move business wise because people will then order an higher amount per order. It is also efficient for the last-mile logistics because not every other day the same addresses have to be included in the route planning, and transport circulations are consequently reduced.

The LNM for Pure-play E-tailers of take-away meals and Pure-play E-tailers of daily groceries are very similar because of the instant delivery service. After an order is placed, the deliverer and the order are matched. While the order is being prepared, the delivery

driver goes to the service area distribution centre, restaurant or dark kitchen. The main difference between the two models has to do with the fact that Pure-play E-tailers of take-away meals offer an outsourcing model for restaurants and dark kitchens. Their service is to cover the last-mile. In addition, Thuisbezorgd.nl is slightly different because restaurants or dark kitchens can choose to take care of the delivery themselves or use the Thuisbezorgd.nl delivery service (Cashdesk, 2018). The restaurants or dark kitchen concepts pay the platforms a commission between 13% - 30% for each order. The percentages of commission depend on whether the order is home delivered or that it will be collected by the consumer (Jacobs, 2020; Kitchen in the Skies, personal communication, Jun 24, 2021). The take-away meal costumers will have to pay a delivery fee if the restaurant or dark kitchen has determined this, and the daily grocery costumers will have their order delivered for €1,80 apiece. Although none of Pure-play E-tailers for daily groceries doing so have yet shown that this is a profitable logistics model, investors are convinced of this market model, as the operators raise billions of euros in investment rounds (Amsterdam University of Applied Sciences, personal communication, July 7, 2021; Business Insider Nederland, 2021).

Some of the Pure-play E-tailers for subscription-based meal boxes stand out when it comes to the delivery method. Marley Spoon and Familiebox use the outsourcing model, and EkoMenu use both delivery services companies and its own transport in Amsterdam for the delivery. The delivery services company Trunkrs, responsible for the delivery of Familiebox, aims to operate efficiently by deploying the delivery vans and distribution centres of other postal operators, such as DHL. Trunkrs operates after regular working hours to make use of the excising facilities (e.g., transport and DC's) of other companies (Trunkrs, personal communication, June 10, 2021). This strategy avoids additional transport circulations. Considering the environmental impact of transport circulations, this type of operation is advantageous for the city, but a self-supporting model is still dominating this niche market.

Operational Scale (OS) and Distribution Centres (DC)

The operational scale (OS) in which suppliers operate is significant for the distribution centres (DC) characteristics (i.e., location and size). The Bricks and Clicks operators for weekly groceries operate for their home delivery section from DCs that are mainly located in the Randstad area. Albert Heijn has three DCs for online purchases all located within

the circle of the Randstad area, besides two national DCs and four regional DCs (Marlisa, 2018; Van Velzen, 2020). The variety in DC locations makes it possible to operate on a national scale. The same almost applies to the Pure-play E-tailers for the delivery of weekly groceries. The differences between Bricks and Clicks operators and the Pure-play E-tailers are mainly in terms of existing networks. Since the Albert Heijn has been able to build its distribution for online purchases from existing networks, DCs specifically aimed at online purchases were not necessary. However, due to the growth of the online sales, DCs for online purchases have been expanded by new locations in recent years (Logistiek.nl, 2017). For an operator like Picnic, which started without existing networks, a distinction between different DCs was not necessary. Focus on the last-mile has always been part of their overall operation. Picnic now has 13 DC locations across the country (Logistiek.nl, 2021).

The study did not reveal the size, exact locations and quantities of the DCs of Pure-play E-tailers for subscription-based meal boxes. What became clear is that these platforms operate on a national scale, so it is assumed that the characteristics are similar to those of Pure-play e-tailers of weekly groceries.

The promise of Pure-play E-tailers for daily groceries to deliver groceries within 10 to 20 minutes affects the OS and DC locations. The DCs, or dark stores, serve a specific surrounding area within the city, to guarantee the fast delivery offered (Mason, 2019; Grudzien, 2020). This is manageable because only available products for that service area, based on the stock of this specific DC, will be shown to consumers using the app (Amsterdam University of Applied Sciences, personal communication, July 7, 2021). From this point of view, these platforms therefore operate on a neighbourhood scale. However, as the neighbourhood DCs are located throughout the city, the OS can also be determined as a city scale. The consequence for the city is that many DCs are being developed in neighbourhoods and, as mentioned in the literature review, local authorities need to fit logistical facilities within the already dense city boundaries (Dablanc et al., 2017; Mason, 2019; Grudzien, 2020).

The OS for Pure-play E-tailers for take-away meals do not depend on the DC locations but on the affiliation between the platforms and the restaurants or dark kitchens and their locations. The platforms serve the consumers within a delivery range of 3 kilometres to ensure the freshness and quality of the food (Kitchen in the Skies, personal communication, Jun 24, 2021). This means that the OS is basically part neighbourhood

part city scale. However, since restaurants and dark kitchens have been added to the platforms all over the city, the city scale is dominant.

These DCs within the city boundaries are used by other city scale platforms. The local initiative Local Heroes functions as a DC. Local Heroes provide a pick-up point located at the Ten Kate market where the local entrepreneurs bring their products to be collected by the consumers (figure 6) (Local Heroes, personal communication, April 29, 2021). Boeren voor Buren uses a DC located in the city boundaries as well. The convention centre RAI Amsterdam, located in the south, nearby the Zuidas business district, serves as a distribution hub for this initiative (Municipality of Amsterdam, personal communication, July 21, 2021). Het Wijnhuisje currently uses their physical store in Amsterdam-West as a DC. They aim to expand within the city boundaries (Northern, Southern and Eastern parts of Amsterdam) in order to having to cover less distances (Het Wijnhuisje, personal communication, July 22, 2021).

Figure 6: Pick-up point Local Heroes



Source: Instagram local.heroes.online (Februari 24, 2021)

Mode of Transport

The OS and DC locations are significant for the choice of transport. Platforms operating on a larger scale prefer to use normal vans or (small) electric vans over parcel (e)-bikes because of the number of kilometres that need to be covered, as well as the greater volume and the thus needed capacity of transport. Picnic was one of the first to supply the city

using small Light Electric Vehicles (LEV) (Van Asseldonk, 2017; Amsterdam University of Applied Sciences, personal communication, July 7, 2021) (figure 7). Albert Heijn is one of the pioneering companies which pilots such a form of transport in smaller cities in the Randstad area (Transport Online, 2021). Other large grocery concerns have not published their specific actions of changing to sustainable transport. The EV's of Crisp are larger in comparison to the EV's of Picnic. Concerning the limited public space and parking problems, this can be disadvantageous, but fewer vans need to enter the city to deliver the same volume of delivery on the other hand.

Figure 7: Parked Picnic EV-van for home delivery



Source: ANP (n.d.)

In table 4 it is shown that normal vehicle vans are the dominant means of transport of Pure-play E-tailers for subscription-based meal boxes. It is particularly striking as this operator category does a lot to promote sustainable production circulation by using recyclable packaging and tree planting campaigns. Although participant 8 named this category more as an example that focuses on the product rather than the logistics, this study does not reveal a specific explanation for this (Amsterdam University of Applied Sciences, personal communication, July 7, 2021). However, it all could depend on the costs. Participant 1 explained that the high costs for alternatives as the argument for using normal vehicle vans for Boeren voor Buren (Municipality of Amsterdam, personal

communication, July 21, 2021). For recently established platforms transport is a big investment. Participant 7 and 8 explained that the turning point of investments for transport lies between 5 and 10 years, depending on which transport is purchased (Trunkrs, personal communication, June 10, 2021; Amsterdam University of Applied Sciences, personal communication, July 7, 2021). The Pure-play E-tailers for daily groceries and takeaway meals, and Local initiatives for daily and weekly groceries, commonly use (parcel) (e)-bikes. Given the city scale in which they operate, and the bicycle infrastructure in Amsterdam, this is an explainable transport mode. Despite the fact that the transport method is beneficial, in terms of pollutant emissions, it may have other effects on the city. As mentioned by Ijmker (2021) and Dablanc et al. (2017) road safety is put at risk. This is partly due to the promise of fast delivery, but also due to high numbers of orders and hence great number of deliverers (Trunkrs, personal communication, June 10, 2021; Amsterdam University of Applied Sciences, personal communication, July 7, 2021).

Table 4: Home-delivery features

Company	Days and Times	Transport mode
De Krat	Monday, Thursday and Friday from 5 pm till 10 pm home delivery	Parcel bikes & Normal vehicles vans
Boerschappen	Tuesday, Wednesday and Friday in two timeslots (12 noon till 5pm or 5pm till 9pm) and on Saturday and Sunday between 9 am and 5 pm.	Normal vehicles (vans)
Eko Menu	Thursday, Friday, Sunday or Monday. Delivery time depends on postcode area.	E-vehicles
Familiebox	Monday between 5 pm and 10 pm. Extra delivery days for Randstad area on Sundays between 5 pm and 10 pm.	Normal vehicles (vans)
Hello Fresh	Saturday, Sunday, Monday, Tuesday and Wednesday. Available delivery times depend on the postcode area.	Pilots with e-vehicles but most normal vans
Marley Spoon	Tuesday and Wednesday between 8am and 1pm & between 5:30pm and 9:30pm. Friday between 5:30pm and 9:30pm. Saturday 8am and 1pm. Sunday between 2pm and 7 pm & between 3pm and 8pm & between 5pm and 10pm.	Normal vehicles (vans)
Dinnerly	Every day of the week between 8am and 5pm. Delivery time depends on region and day.	Normal vehicles (vans)

Delivery Timeframe

Except for the Boeren voor Buren and the Pure-play E-tailers offering instant delivery, the Amsterdam food delivery operators work with a certain timeframe as booked by the customer. This can be explained taking the route planning and the prevention of failed delivery into account. As mentioned earlier, the provision of delivery timeframes is used by Picnic as a tool to steer the route planning (Van Asseldonk, 2017; Van Beek, 2020). Trunkrs uses time in terms of efficiently and sustainably deploying their delivery vans at different times as to prevent the increase in the number of vehicles on the road (Trunkrs, personal communication, June 10, 2021). Platforms try to distinguish themselves by offering a wide range of options and fast delivery including 24-hour services. The Pure-play E-tailers for daily groceries are an good example of this. Also, Brick and Clicks operators commonly offer multiple delivery days per week and multiple delivery times per day. They often use the "*ordered today before ... hours, delivered tomorrow*" rule (Ikvergelijkhet.nl, n.d). By looking at table 4 it will become clear that the circulations of the delivery of subscription-based meal boxes commonly occurs after regular working hours. However, the delivery times of Hello Fresh and EkoMenu are not clear. The delivery time of Hello Fresh, EkoMenu and Dinnerly depends on the postcode area of the consumer. This is comparable to the logistic model of Picnic, which prioritises route efficiency.

Relationship Citizen-Consumer

Platforms promote their products and services by distinguishing themselves using different last-mile logistic features to compete with other platforms. In this way, the platforms play into supply to reach the demand of specific citizen-consumers. Bricks and Clicks operators have the advantage of being able to use their existing network. Citizens-consumers are known at the companies behind the digital platforms because of their experiences in the physical grocery stores which are meticulously registered. As mentioned, Pure-play E-tailers for take-away meals and groceries connect with citizen-consumers by offering fast deliveries and 24-hour services. Beyond that, Pure-play E-tailers for daily groceries offer refunds of the order amount when an order is delivered later than the promised 10 – 20 minutes. Other strategies focus on locality, such as Local Heroes, Het Wijnhuisje and Boeren voor Boeren. The latter operator also contributes to

the social nature by providing the less fortunate with fresh fruit and vegetables at lower prices.

4.2 Amsterdam's response

The following paragraph provides insight into the responses of the consumer-citizens of Amsterdam and the municipality of Amsterdam to the food delivery services. The first subparagraph will describe the practices, experiences and view of citizen-consumers on food delivery platforms with regard to their physical features and the expectations citizen-consumers regarding ordering practices. The second subparagraph highlights the response of the municipality of Amsterdam to city logistics and to the last-mile logistics of food delivery services, and the policy or policies that influence the food delivery services.

4.2.1 Citizen-Consumers View

The view of Amsterdam's citizen-consumers is based on the qualitative data obtained in this research. Based on this data, 75% of the respondents are convinced that the food delivery has had an impact on the city. Explanations from the respondents for this are; traffic density on cycle paths and roads because of deliverers, fast bicycles, and deteriorating street scenes. This is in line with findings in the literature (Dablanc et al., 2017; Bates et al., 2018; Grondys, 2019; Viu-Roig & Alvarez-Palau, 2020; Richardson, 2020b; Bissell, 2020; Bereitschaft & Scheller, 2020; Florida et al., 2021). A few respondents mentioned parking problems, the disappearance of stores and the decrease of social cohesion that can arise as a result. These explanations can be clarified. Firstly, respondents experience (almost) daily deliveries of groceries, meal boxes and takeaway meals in every physical infrastructural feature. More than 82% of the respondent's experiences deliverers appearing in their own streets on a daily basis. The daily experiences of seeing delivery drivers also apply to their presence on sidewalks (66%), bicycle paths (79%) and roads (56%) (appendix 6). Secondly, the respondents were asked about the impact on these physical features. The impact on the bicycle paths is the seen as the greatest. Half of the respondents think that the impact on bicycle paths is negative, but 24% of them think that the impact is very negative. The negative impact on the sidewalks and roads are seen as being about the same and one individual thinks the impact on the sidewalks is very negative. However, respondents' thoughts about the

impact of parking are striking, as 14% of them think the food delivery has a very negative impact and more than 24% of the respondents believe this has a negative impact (appendix 6). This shows that citizen-consumers are aware of the deliverers in the city and the influence of this on the dense infrastructures.

The municipality already determined that citizens of Amsterdam can feel unsafe, due to the traffic of logistics (Gemeente Amsterdam, 2020a). However, their findings were based on freight transport and parcel vans, although this research does not directly show that an unsafe feeling arises due to the pressure on the bicycle paths and faster bicycles.

In addition, the deteriorated street scenes are, according to Florida et al. (2021), affected by the high street losing its commercial role. However, other concerns are mentioned by the consumer-citizens which could be causes for those deteriorated street scenes. Examples of these are parking problems, the disappearance of shops and the decrease of social cohesion. Furthermore, citizen-consumers indicated that shops might disappear because of the emergence of food delivery platforms. This can also affect the street scene due to the then occurring vacancy of buildings. Also, the decrease of social interaction is mentioned by consumer-citizens. This is not particularly mentioned in the literature, although Richardson (2020b), Bereitschaft & Scheller (2020) mention that online ordering is a form of self-service, which might replace traditional dining establishments.

The conveniences of the home delivery and the saving of time seem to be the dominant motives for ordering groceries, meal boxes and takeaway meals online. This means that the platformised city services in the Smart City of Amsterdam have accomplished what they aimed for; more efficient city services to improve urban life (Harrison et al., 2010; Albino et al., 2015; De Jong, Joss, Schraven, Zhan & Weijnen, 2015; Silva et al., 2018; Leyerer et al., 2020; Heumann & Breitner, 2020). Moreover, Covid-19 affected the ordering practices of the citizen-consumers, as 58% of the respondents ordered more groceries, meal boxes and takeaway meals online. The study did not clarify whether social distancing or quarantine are the particular reasons for this increase to occur. Nevertheless, the daily confrontation with deliverers on infrastructural features or their impacts on the city are not reasons for citizen-consumers to order less food online. On the contrary, 40% of the respondents expect to place more orders in the next five years, and 51% expects to order food online in quantities about the same as now. Striking explanations the respondents give are; expectations of more income, expectations for

more accessible platforms and technology which increases the convenience, expectations of better quality and delivery (quicker), saving time, and the convenience of home delivery. Despite the high expectations for ordering more groceries, meal boxes and takeaway meals online in the future, 65% of the respondents expect to visit physical grocery stores about the same number of times as they currently do in the upcoming five years. Despite the given that respondents felt that shops might disappear because of the emergence of food delivery platforms, the respondents also acknowledge grocery stores as a needed functionality for their basic necessities. Another reason to go to a physical store is that they expect to be visiting more specialty stores in the future.

4.2.2 Municipality's View

The municipality of Amsterdam had recognised the importance of logistics to supply the city, and takes responsibility to reduce the environmental, safety and infrastructural effects that are caused by this (Municipality of Amsterdam, personal communication, July 15, 2021; De Vries, 2021). In contrast to passenger transportation, the inclusion of logistics in urban planning is fairly new (Fossheim & Andersen, 2017; Gonzalez-Feliu, 2018), as is the case for the municipality of Amsterdam. Currently, city logistic policies are fragmented by different policy documents and departments. In the Letter on Logistics Strategy, published on May 18th of this year, the Councillor of the department of Traffic and Transport announced that a new strategy for city logistics is being drawn up and that this will be published in the fall of 2021 (De Vries, 2021). The council letter mentions four challenges for the city of Amsterdam:

1. keeping the busy city accessible;
2. improving road safety;
3. reducing the load on quays and bridges;
4. reducing the impact on air quality (De Vries, 2021).

The current vision already includes some of these challenges by its formulation: *accessible city logistics, which are cleaner and safer, and performed with lighter vehicles* (Municipality of Amsterdam, personal communication, July 15, 2021). Urban logistic challenges the municipality has taken into account are based on the interactions between the operators and citizen-consumers (i.e., human entities) and their practices involving transport (i.e., non-human entities) thus shaping the infrastructures of this city. This interconnective relationship is shown by the explanation of participant 2 on the transport

use of bicycles: “...what if everyone switches to those kinds of transport modes, how should you organize your bicycle paths and is it necessary to abandon such vehicles on bicycle paths and make it compulsory to drive on the road, or all kinds of other physical adjustments” (Municipality of Amsterdam, personal communication, July 15, 2021). Municipal action is taken through an area approach and in a responsive way. Participant 2 explained that in order to meet the various intended public goals, it is the most efficient, from a logistics point of view, to look per area and per category to see what area and category should receive the most attention. This means that in a specific zone a certain transport mode will or will not be allowed. The continuous search is for the most optimal option (Municipality of Amsterdam, personal communication, July 15, 2021). Furthermore, the logistical impact size seems to determine the accuracy for actions in terms of policy. Participant 2, telling about the lack of last-mile bicycle delivery policies, stated that: “*The concept of supply by bicycle and carrier cycle is being considered within the municipality...because it is still a small amount, despite the fact that there are now quite a few, but so far it is still going well.*”, (Municipality of Amsterdam, personal communication, July 15, 2021). This responsive approach is also evident from IJmker's (2021) motion. The urban tensions caused by food delivery platforms are raised within politics currently, but only after the apparent tensions has arisen. This confirms the critiques in literature about the lack of discussion by local authorities, concerning last-mile logistic issues and the lack of knowledge for appropriate policy measures to be taken for the impact of e-commerce on urban areas (Su et al., 2013; Dablanc et al., 2017; Barns, 2019; Viu-Roig & Alvarez-Palau, 2020).

By looking at figure 8, the responsive policy is an explanation for the focus on heavy logistics (i.e., construction sites (30%), hospitality and supermarkets (25%) and retail logistics (20%) in the policy measures. The explanation for the absence of a concrete policy, or the disregard for last-mile food delivery flows in the council letter are similar. This is not yet recognised as being a particular logistic flow. However, the platform-based food deliveries can be distinguished in service logistics and in parcel delivery logistics (which account for approximately 15% and 7 % of the city logistics in relation to traffic) (figure 8) (Gemeente Amsterdam, 2020a). The delivery of takeaway meals can be considered as service logistics, because those platforms offer the connection between citizen-consumers and restaurants, in which the delivery can be considered as a logistic service. The delivery of groceries and meal boxes can be considered as parcel deliveries

because such platforms offer purchases of goods online. When one takes this categorisation into account, the food delivery platforms belong to the 22% of overall the distribution in Amsterdam in relation to city traffic. In addition, the new strategy is based on frameworks which relate to road safety, load capacity and air quality matters (De Vries, 2021), each of which are key aspects with regard to last-mile food delivery.

Figure 8: Distribution of logistics in Amsterdam in relation to city traffic



Source: Gemeente Amsterdam (2020a)

Despite the given that the municipality does not particularly mention the last-mile logistics of food delivery platforms, the logistic and mobility measures taken are precise for this industry. Table 5 shows which measures apply to the last-mile logistics for food delivery platforms in Amsterdam. Despite that mobility and logistics differ in terms of the cost structures and purposes of transport and transport modes, a strict separation between the two is not apparent in the policies. For instance, both policy address area orientated restrictions which can influence the logistics operations or choice of transport, such as weight restrictions and emission zones.

Table 5: Policy measures applicable to platform-based food delivery in Amsterdam

Regulation or incentive	Aim policy
City Logistics	
Location hubs	Regulate supply of the city
Multifunctional service lanes for loading and unloading	Regulate supply of the city
City delivery map	Regulate supply of the city
Pilot LEV	Reducing emissions
Mobility	
Stimulate EV's	Reducing emissions
Charging infrastructures	Reducing emissions
Low emission zone	Reducing emissions
Zero emission zone	Reducing emissions

Location hubs

In the upcoming years, the municipality will focus on logical switching points for transfer and transshipment. Urban space will be used by combining facilities, such as charging points for (large) vehicles, pick-up points for parcels, and transfer locations for people and small-scale logistics. Such developments are important for the operations of food delivery platforms. Not only optional locations, based on regional area perspectives, (Metropol Region Amsterdam) are examined, but also locations operating at a neighbourhood level. Especially the city scale operations of Pure Play E-tailers for daily groceries and take-away meals and local initiatives could be influenced by this. The municipality does not necessarily look at locations where all these combinations are possible, but clustering functions is definitely beneficial in terms of scale (Mobility Region Amsterdam, personal communication, April 30, 2021). Finding a location for such hubs, especially for small neighbourhood hubs, is difficult because public space is scarce. For such hubs, existing buildings in neighbourhoods would be most suitable (Municipality of Amsterdam, personal communication, July 15, 2021). Boeren voor Buren, is already using one such building (The RAI Amsterdam). The municipality searches for suitable locations for larger hubs at nodes situated near highways such as the A10, A1 (east), between the A2 and the train track Amsterdam- Utrecht (south-east), the A4 (south-west), and the A5 (west) (Gemeente Amsterdam, 2020a). Such locations could primarily influence the

operations of Bricks and Clicks and Pure-play E-tailers for daily groceries and subscription-based meal boxes. Moreover, for Boeren voor Buren locations situated at nodes of the city are also interesting, as they distribute from their DC to pick-up locations in the city using vans.

Multifunctional service lanes

A land-use based solution for city logistics is the multifunctional service lane. The municipality aims to facilitate space for rapid loading and unloading actions and charging points (Gemeente Amsterdam, 2020a). According to participant 3, the increase in online purchases will also increase the demand for such places (Mobility Region Amsterdam, personal communication, April 30, 2021). On the one hand, this indicates a contribution for facilitating delivery of online purchases, but on the other hand, it is specifically mentioned in the policy that this may offer solutions for supplying the city (i.e., heavy logistics) as well as for touring cars stops. Combining these facilities to accommodate multiple logistic transports or specific locations does not become clear. Therefore, it is difficult to determine whether this is concerned with the last-mile delivery of food delivery platforms.

City delivery map

In order to enhance its knowledge about logistical hotspots, the municipality is developing a city delivery map. This map will give an integral view of logistics access to the city, and of the space and facilities available for logistics in the city. As soon as new policy is in place, the map will show e.g., where the zero-emissions restrictions for freight transport from 2025 onwards apply, as well as showing charging infrastructures and hubs, at both neighbourhood and regional level. The aim is to provide a clear indication of which vehicles are allowed to drive where, and can load and unload under what conditions (Gemeente Amsterdam, 2020a). In order to solve problems at a city level, customisation can be offered in which this map may make a contribution to. This can contribute to the logistic operations of all food delivery platforms, in terms of route planning, choice of DC locations or transport modes. Although the municipality recognises the importance of taking interaction in the logistical processes into account, the area approach becomes clearer by developing such a map.

Pilot LEV, stimulating EV's and charging infrastructures

The municipality aims to replace 10-15% of the delivery vehicle rides in order to come up with a sustainable solution for the last-mile. Stimulating alternative sustainable transport modes is done by cooperating with the logistic sector and knowledge institutions, by experimenting with Light Electric Freight Vehicles (Licht Elektrisch VrachtVervoer (LEV's) in Dutch) through pilots (Gemeente Amsterdam, 2020a). This study did not clarify whether the food delivery platforms were part of this cooperation in Amsterdam. Although LEVs are cleaner and more efficient, the vehicles take up a lot of space and because of the battery the vehicle's weight is heavier (Gemeente Amsterdam, 2020a; Municipality of Amsterdam, personal communication, July 15, 2021). Thus, the trade-off between optimal efficiency and meeting goals is recurring here too. Furthermore, the municipality stimulates the use of electric vehicles by investing in electric charging infrastructures. The number of electric charging points and stations has increased by almost 49% between 2018 and the second quarter of 2020 (Gemeente Amsterdam, n.d, c). The realisation of this is difficult because the public investments necessary are very expensive, however. The high costs, and investment tipping points mentioned earlier as constraints for food delivery platforms, such as Boeren voor Buren, appear to be a constraint for public parties too. By cooperating with private parties these costs could possibly be reduced. Nevertheless, participant 2 pointed out that the municipality is a public figure, which has to be careful of its collaboration with parties, by staying detached from the process as much as possible as to avoid making arbitrariness and influence competition (Municipality of Amsterdam, personal communication, July 15, 2021).

Low and zero emission zones

The municipality decided that, in order to supply the city sufficiently in the future, urban logistics has to become cleaner, lighter and more efficient. This had a direct influence on the operations of the food delivery platforms. An emission-free area for delivery vans and trucks within the A10 ring road by 2025 is set as an ambition. For Amsterdam, this means that a 'Green' environmental zone applies, in which the number of pollutants emitted by a diesel vehicle determines whether the vehicle is allowed to enter the zone or not (Rijksoverheid, n.d.; Gemeente Amsterdam, 2009; Gemeente Amsterdam, 2019a; Gemeente Amsterdam, 2020b). The zone is divided in three sub-zones, where the scope of the rules differs depending on the type of vehicle (passenger cars, moped and light

moped, freight, order, bus, and taxi) (Gemeente Amsterdam, n.d., c; Gemeente Amsterdam, 2020b). In terms of transport mode choices, or route planning, such zones influence the operations of food delivery platforms. A day exemption can be requested for the low-emission zone. Several reasons to having to establish a low-emission zone strategy are mentioned in the policy documents, but these mainly concern emissions of nitrogen oxide, particulate matter, soot and CO₂ and the Amsterdam's citizens experiences of nuisance and a sense of unsafety because of trucks and delivery vans in the city (Gemeente Amsterdam, 2020a; Gemeente Amsterdam, 2019a).

4.3 Tensions and opportunities

This paragraph highlights the key tensions in, and opportunities of, the last-mile logistics that arise from the actions of the food delivery platforms in Amsterdam. The insights about the tensions and opportunities show that two paradoxes appear in terms of a transport-paradox and a desirable-city-paradox.

Tensions

Direct reasons for IJmker (2021) to submit her motion were based on logistical networks with city scale operations, and DCs within the city boundaries, causing tensions in Amsterdam. This research confirms these tensions by highlighting the change of public space and street scenes because of double-parked delivery vans, loitering delivery drivers waiting for an order, and taped-up windows of dark stores and kitchens. Figure 9, 10, 11 and 12 show how street scenes are changed and how roads are blocked. The loitering delivery drivers have taken over the sidewalk, which not only creates a different streetscape but also a different distribution of space than for it was originally intended. This may explain the (very) negative effect on sidewalks as per the consumer-citizens' experiences (appendix 5).

Figure 9: Food delivery transport blocking the sidewalk in the Staatsliedenbuurt neighbourhood



Source: Geert on (September 17, 2018)

Figure 10: Zapp's dark store in the De Pijp neighbourhood



Source: photo taken by the author (August 29, 2021)

Figure 11: Bicycle deliverers waiting on the sidewalk in the De Pijp neighbourhood



Source: Fertinel (2020)

Figure 12: Bicycle deliverers waiting on the sidewalk in the centre area



Source: Ploos van Amstel (2019)

In addition to this, the literature has pointed out related concerns with regard to the change of street scenes because of the threat towards traditional dining establishments (Deliverect, n.d.; Bereitschaft & Scheller, 2020; Richardson, 2020b). Participant 5 does not relate to these concerns as being tensions. According to him there are two different motivations for consumers; a dinner with an experience and having good food delivered at home. He states that: *“So, in that sense, not necessarily a threat to the restaurant world. Where dark kitchens pose a threat to restaurants in particular is in their delivery business. Because dark kitchens are a delivery-restaurant and focus on delivery. That is what such concepts will excel at compared to restaurants that deliver on the side. The delivery part is often less well executed, because it is in second place.”* (Kitchen in the Skies, personal communication, June 24, 2021). The consumer-citizens are not overly concerned about the dining establishments, but are more hesitant about the future existence of physical stores. Besides the deteriorated street scenes, the disappearance of physical stores might come with a decrease in social cohesion. According to participant 8: *“For example, for elderly, shopping groceries can be a day-excursion where people meet.”* (Amsterdam University of Applied Sciences, personal communication, July 7, 2021). Critical thoughts stated about the question: *If the groceries are ordered online and stores are disappearing, where should our generation have their daily physical social contact?* should determine whether this e-commerce culture, in particular for food, is desirable or whether this creates tensions in urban life on social aspects.

A concern that not particularly occurs in the literature, is the lack of accessibility of the city, due to its infrastructural quality. The research data shows that infrastructural improvement is necessary (De Vries, 2021, Municipality of Amsterdam, personal communication, July 15, 2021; Mobility Region Amsterdam, personal communication, April 30, 2021). Participant 4 raised some tension by referring to a logistical disadvantage: *“The poor road surface makes it sometimes difficult for us to ride certain routes with the cargo bike, because otherwise the bottles of wine will break. That is our main drawback. So, we now have to take a good look at which routes we cycle and sometimes we even have to make a detour because the road is not accessible enough for us to drive over it.”* (Het Wijnhuisje, personal communication, July 22, 2021). The necessity to maintain, or improve, the accessibility of roads and relieve the burden on bridges and quay walls to prevent further overdue maintenance from increasing pressures is recognised and implemented in local policies (De Vries, 2021, Municipality of Amsterdam, personal

communication, July 15, 2021; Mobility Region Amsterdam, personal communication, April 30, 2021).

The concerns regarding road safety raising tensions are not directly confirmed in the case of Amsterdam through this research. However, it can be assumed that the operations of food delivery platforms create unsafe situations. Along with the concerns of the municipality (IJmker, 2021; Gemeente Amsterdam 2020a), the citizen-consumers views clarified that the impact of food delivery platforms on the bicycle paths is the greatest when compared to other physical features, and is commonly defined as having a negative impact (appendix 6). Although the occurrence of unsafe bicycle paths is not directly evident from the data, the lack of academic discussion, or municipal analysis regarding road safety for bicycle couriers (Dablanc et al., 2017) was partly confirmed by the lack of incorporation of logistical methods in both current and upcoming policies. Furthermore, the concerns regarding road safety align with the tensions of congested roads. A transport circulations increase is partly confirmed in the case of Amsterdam. The citizen-consumers views show that citizen-consumers experience the presence of deliverers in many of the physical features of the city. However, it is not analysed whether transports of this kind have increased. Although this can be assumed, as the citizen-consumers view points out that, since the pandemic the majority of the respondents ordered more food via food delivery platforms. This indicates an increase of transport circulations. Besides the road safety tensions, such an increase could create tension regarding environmental impacts (such as the amount of air and noise pollutions. This study did not focus on such impacts in particular. Nevertheless, environmental concerns are now part of local government policies in more detail (e.g., Pilots LEVV and EV and low emission zone).

The local policies, aiming at reducing the environmental impacts and increasing the accessibility of the city, reduce tensions on the one hand, but also cause tensions on the other hand. Tensions arises because it is very difficult for private parties to comply with, and respond to, policy measures such as emission-free zones. This influences the operations of service and parcel logistics. Companies are forced to adjust their transport strategies, because of zero and low emission zones banning certain vehicles in some of those zones. In order to comply with low emission zones restrictions a different type of transport is needed. In order to keep it profitable and realistic for companies to invest in desirable transport it is important that the tipping point is taken into account by

formulating a strategy for city logistics of Amsterdam. During the previous policy adoption, this was not taken into account, according to the explanation of participant 8. He explained that: *“The current market will not be ready for completely emission-free areas in 2030 as set out in the municipal goals. The investments in appropriate transport should have already taken place last year to make it profitable.”* (Gemeente Amsterdam, 2020b; Amsterdam University of Applied Sciences, personal communication, July 7, 2021). Tensions because of high costs also apply to the municipality. An attempt to reduce costs is envisaged by cooperating with private parties, but the government must be careful of its role in the market. (Municipality of Amsterdam, personal communication, July 15, 2021).

Also, appropriate vehicles for low emission zones need to be developed further technology-wise. The current LEVs cannot cover long distances. Participant 2 explained that batteries in these vehicles are not able to reach the entire Amsterdam area in one round yet. This means that these vehicles can only cover a certain distance and must then be recharged. The municipality is therefore looking at possibilities for increase the number of charging hubs, but as long as these are not available, companies will install their own hubs in the urban area in the meantime in order to tackle this problem (Municipality of Amsterdam, personal communication, July 15, 2021). This does not seem to solve the extra circulations. Bearing in mind the city’s increasing density, tensions could occur in the scarce public space. Moreover, based on the following explanation of participant 8, this approach is a shortcoming in policy that may create tensions in the long run. *“Policy is more focused on solutions instead of what is really the problem. So, when making policy, you have to think about what problems you want to solve and what your goal is. Nowadays it is more like: we have heard that we need a hub so we are going to make a hub. But first look, what problem does a hub solve?”* (Amsterdam University of Applied Sciences, personal communication, July 7, 2021).

Opportunities

The opportunities relate to joining forces and knowledge, and bulking deliveries. Participants 3 and 7 explain that the distribution flow increase can be avoided, by merging deliveries. They call this *white label* logistics, which is based on bulky delivery transport. The delivery company stays unknown as the delivery van is driven without marketing descriptions, and orders from different (postal) companies are being distributed

(Mobility Region Amsterdam, personal communication, April 30, 2021; Trunkrs, personal communication, June 10, 2021). Participant 7 stresses that *“Combining flows is the holy grail behind logistics, also called ‘multi-modal transport’. However, such ideas are not new in the logistics sector.”* (Trunkrs, personal communication, June 10, 2021). The implementations are delayed by operators because of financial interests and advantages of the self-supporting model (Trunkrs, personal communication, June 10, 2021; Amsterdam University of Applied Sciences, personal communication, July 7, 2021). Stimulating the outsourcing of last-mile delivery might tackle such problems and may result in the bulking of deliveries. As Butrina et al. (2017) and Bates et al. (2018) pointed out, the driver’s knowledge about routes, parking and accessibility contributes to reducing spatial tensions, because traffic will be less congested, and loading and unloading areas can be used more efficiently. Delivery services companies specialised in the last link of the supply chain have such knowledge (Rose et al., 2017; Yu et al., 2017), whereas a self-support model will only cause more road movement (Yu et al., 2017; Trunkrs, personal communication, June 10, 2021; Amsterdam University of Applied Sciences, personal communication, July 7, 2021). The advantages of the outsourcing model, simultaneously show the disadvantages of the self-support model. Due to the lack of knowledge about the last-mile, not enough attention is being paid to efficiency or sustainability. This can be reflected in the choice of the means of transport (Amsterdam University of Applied Sciences, personal communication, July 7, 2021). This might explain the dominant choices of transport the Pure-play E-tailers for subscription-based meal boxes take besides the costs.

The role of government (both local and national) in exerting pressure on bulking deliveries or ‘multi modal transport’ remains debatable. Participant 7 is very clear about the accuracy for the government to interrupt. *“I think that it will only change if it is forced by the government. For as long as logistics has existed, it has been the holy grail, yet it is not used. But the government has a very important role to play here, because the market is clearly demonstrating that it will not take up the solution on its own, and when the government is done with 10,000 flows that can be made into 1,000, then it is important to focus on that.”* (Trunkrs, personal communication, June 10, 2021). Participant 8 is doubting the government’s role here. On the one hand, white label logistics can reduce the pressure on the city because flows of goods are bundled. On the other hand, the government must be careful about interfering in the market (Amsterdam University of

Applied Sciences, personal communication, July 7, 2021). The latter is also endorsed by participant 2, as she explains that: *“Responding to commercial activities is closely monitored in policy. Sometimes it is possible in the form of a pilot, but these do not last forever. Moreover, if you allow one market player to do it, you should also allow the other. As a municipality, you cannot create a monopoly, of course.”* (Municipality of Amsterdam, personal communication, 15 July 2021). Moreover, this must be considered from a broader perspective, rather than just focus on transport transitions for efficiency and sustainability. In terms of relationships between human and non-human entities, new actors and new ways of acting, government involvement in transport transitions goes beyond a reduced distribution flow or low-emission goals. This is pointed out by the view of participant 8 where he states that *“Logistics is a chain and you can't say that it has to be made sustainable now. So, you have to start thinking in terms of chains, and municipalities can't do that because they are constrained by their own city boundaries, which is why it's good to look at an area agenda. But actually, you should be looking at a national logistics agenda. It is so complex that it cannot be realised now. So as a city you have to look not only at yourself but also at the region.”* (Amsterdam University of Applied Sciences, personal communication, July 7, 2021).

Paradoxes

Food delivery platforms and citizen-consumers can offer solutions for urban issues with regard to last-mile delivery; however, such solutions can be limited by government regulations, financial constraints or citizen-consumers demands, and vice versa. The explanation for these findings can be found through two paradoxes that appeared alongside this study.

Firstly, the *paradox of transport* arises, due to the practical constraints of the alternative sustainable choices of transport causing tensions in the scarce public space. The municipality is stimulating the logistics sector to use alternative sustainable transport by introducing pilots and regulations in order to reduce environmental consequences. However, due to the constraints of such transport modes, the dense city could face more transport circulations. It is not possible to transport the same volume of goods, or cover the same distances with smaller, lighter and more durable vehicles, than one can with regular vehicles. The size of a transport mode matters for the delivery capacity, and the technologies of rechargeable batteries determine the transporting

distances. More transport will need to circulate in order to compensate for the loss of distance capacities. Therefore, by using such alternative sustainable transport means, the density of the city could increase with all the consequences this comes with. The problems could arise both on roads and on bicycle paths. Bates et al. (2018) noticed that the vehicle size matters in terms of accessibility, but, in the case of Amsterdam, it is more in terms of liveability in the scarce public space. However, liveability in public scarce space is also related to the quality of air and noise pollution. The alternative transport methods offer more advantages than the fossil fuel transport methods do, in that respect.

Secondly, from a socio-material perspective, the *paradox of the desirable world* arises. Although a sustainable and liveable city benefits every city stakeholder, it is not without consequences for the individual practices of the city stakeholders. The citizen-consumer practices, of ordering food online, affect the practices of food delivery platforms and vice versa. The supply and demand mechanism plays a clear role here. The convenience of the smartphone apps used, and customer-friendly deliveries features, provides citizen-consumers only with a small barrier to place an order, but the commercial practices of platforms are stimulated by the great number of orders on the other hand. The commercial practices of the platforms have consequences for the city and can therefore be traced back to the purchase practices of the citizen-consumer. In a desirable world both citizen-consumers, and the platforms, would prefer to see as much ordering as possible without the associated consequences for the city. For the one it serves as a convenience and for the other it means more revenue. This study has shown that convenience plays a major role in the practices of citizen-consumers, as well as in the expectation of future ordering behaviour at food delivery platforms, and that such platforms act to the demand of the citizen-consumers accordingly. Therefore, it could be of value to the city if citizen-consumers look critically at both individual and platform practices, in order to reduce tensions in the city caused by the last-mile delivery of food delivery platforms. By changes in demand, e.g., asking for a more efficient and sustainable last-mile, the resulting intrinsic motivation of commercial platforms might result in new innovations.

5. Discussion

This section will provide answers to the three sub-questions formulated earlier to answer the main question.

1. What platformised modes of last-mile food delivery are emerging in the city?

This question is answered based on the comparative analysis (appendix 3). The different food delivery platforms operating in Amsterdam have emerged during the last two decades and new platform are still emerging during the time of this research. The growth and diversity of food delivery platforms has been accelerated mainly by the Corona pandemic as new Pure-Play E-tailers for daily groceries and local initiatives for weekly and daily groceries have since entered the market. Within four months, the Pure-Play E-tailers for daily groceries have made a significant change to the urban services and space. By offering new products and services the food delivery platforms determined new operational methods and logistical strategies, which have reshaped the city and delivery transport circulations in the city. The food delivery platforms commonly chose the self-supporting LNM, but each with different interpretations and operations. This confronts the city with varying challenges and reforms. The OS, DC, transport mode, delivery timeframe and citizen-consumer relationship are of reciprocal significance for the last-mile operations.

Platforms which perform national scale operations (such as Bricks and Clicks for weekly groceries and Pure-play E-tailers for weekly groceries and subscription-based meal boxes) distribute from regional DCs at nodes in or outside the city. Whilst platforms within city, or with neighbourhood scale operations (such as Pure-play E-tailers for daily groceries and local initiatives for the weekly and daily delivery of groceries and non-subscription-based meal boxes) distribute from DCs within the city's boundaries. These reshape the city differently. In the inner city, existing buildings (such as retail premises, local market stands or conference centres) are used as DCs, which changes the street scene and which require facilities to make the supply from these 'hubs' possible. The operations carried out from those nodes do not change the inner city much, except for an increase in circulations, at various times, due to the associated increase in supply and demand, although the increase in circulations and delivery times shapes the city too (e.g.,

density, congestion, safety, pollution etc.). By giving the platform user the opportunity to order 24 hours a day, this means that the circulations in the city are becoming non-stop events. The transport modes of the food delivery transports vary from using (e)-bikes to (e)-vans. In addition to the operational aspects, costs are also significant for the choice of transport. The dominant choice for the transport mode of weekly products is using normal vehicle vans (i.e., non-electric). The OS plays a key role here, but the lack of knowledge about logistics and investment costs stands in the way of reducing emissions. On a city scale, the transport mode of daily or weekly products delivery, or for providing instant delivery, is commonly done by using (parcel) (e)-bikes. For the city of Amsterdam such transport is efficient in particular, because of its great bicycle infrastructure. In terms of reshapes the roads are mainly part of that, because of the increased circulations in the last-mile food delivery.

The Pure-play E-tailers for take-away meals are slightly different compared to the other platforms, because these platforms function as an outsourcing LNM for restaurants and dark kitchens. Due to the emergence of these platforms dark kitchens emerged. The delivery of their products fully depends on the services the Pure-play E-tailers for take-away meals platforms provide. In terms of DC locations, restaurants and dark kitchens, aligned with the platforms, can be considered to be DCs. In terms of OS, the city scale operation is limited by a 3-kilometre range from the DCs needed to ensure freshness. The reforms in the city, due to the Pure-play E-tailers for take-away meals, are very similar to those due of the Pure-play E-tailers for daily groceries.

2. How is the city responding to the last-mile logistics of the rising food delivery platforms?

Based on the analysis of policy documents, in-depth interviews with public officials and a survey among citizen-consumers this question is answered. To answer this question, a split was made between the responses of the consumer-citizens of Amsterdam and those by the municipality of Amsterdam.

Citizen-Consumer

The citizen-consumer practices towards food delivery platforms have reshaped the city. This indicates socio-spatiality. Costumer food delivery in the city has become a daily

practice in Amsterdam. The wide range of products available, ranging from freshly prepared meals to weekly deliveries, ensures that a broad target group is reached. The competition between the platforms keeps the city busy with food delivery practices 24 hours a day. Citizen-consumers are stimulated by the conveniences offered by the platforms. Regardless whether social distancing or quarantines were specific reasons for this, this study has determined that orders through food delivery platforms increased amongst the majority of respondents. The consumer-citizens recognise upcoming reforms of the city due to food delivery services. The consumer-citizens indicate negative, or very negative, effects within the physical elements of the city (sidewalk, bicycle paths, roads, parking) and are concerned about social matters and street scenes, due to the possible disappearance of physical stores. The impact on the bicycle paths is seen as the greatest. Although this is noted by consumer-citizens, it does not seem to influence their ordering practises. Almost half the respondents indicated that they expect to order more in the near future. Their motivations to do this are mainly because of conveniences, in terms of saving time as a result of home delivery, and better the quality of products and services. With this in mind, there is a clear accuracy needed to addresses the consequences, in terms of socio-material and socio-spatial matters, due to the last-mile delivery of food delivery platforms in local policies.

Municipality

The municipality is aware that new logistic policies are needed. The new strategy aims to address the key challenges with regard to logistics (i.e., accessibility, road safety, infrastructure and air quality). For the usability of the outcome of this research it would have been desirable to include this new strategy in a policy analysis. However, similar to the current policies, there is no indication that the municipality will include the logistics of last-mile delivery of food delivery platforms in this strategy. So, from the municipality a clear response to the last-mile of food delivery platforms or recognition for these platforms as relational processes for the city, i.e., urban assemblages is not expected. The policies regarding logistics are fragmented and spread across different departments. Policies concerning logistics mainly set restrictions on heavy logistics. Despite that the municipality does not particularly include the operations of food delivery platforms, the prevailing measures for logistics and mobility can be considered to be applicable. The municipality applies an area-oriented approach for logistics in a responsive way.

Discussions about socio-material and socio-spatial matters (i.e., liveability, sustainability and road safety) are happening whilst meanwhile new rapid developments of food delivery platforms emerge and accelerate due to the pandemic. The lagging policies, and exclusion of the food delivery platforms in the government's visions or strategies will threaten the achievement of municipal goals (e.g., liveability and sustainability). In order to achieve these municipal goals, a clear long-term vision is needed to address what the current logistic problems are in the city, revised from the public and private perspectives, and what needs to be, or can be, facilitated by the municipality to counter these problems.

3. What tensions and opportunities are associated with the rise of last-mile food delivery platforms in the city?

Based on the findings above this question is answered. The city of Amsterdam faces urbanisation and environmental challenges in which the last-mile of food delivery platforms play a role. Considering this, tensions and opportunities arise which are reflected in two paradoxes.

To maintain, or increase, the liveability and sustainability the municipality sets regulations to stimulate the logistics sector to use less polluting transport means. Stakeholders are not considered beyond economic actors as a part of urban assemblages, whilst the restructuring of the city depends on their operations. This is reflected in the paradox of transport. The alternatives of transport can be efficient in the logistical operations of food delivery platforms, in terms of sustainability or parking problems, by the electric power needed for vehicles and the size of these. Nevertheless, the alternatives of transport have not yet been developed to the same capacity (i.e., volume and distance) as regular transport has. To compensate for losses in this capacity, it will be necessary to increase the circulations. Despite the given that the alternative transports are more sustainable than regular transport is, it is not desirable to stimulate an increase in circulations with regard to road safety, congestion and pollution. This phenomenon is referred to as the paradox of transport.

The food delivery platforms, as urban assemblages, are clarified by the infrastructural role of the city. Deliverers and citizen-consumers depend on the food delivery platforms 24 hours a day and 7 days per week. These relationships are sustained by the reciprocity of supply and demand, as well as by the consequences for the city. This

means that when one of the entities in the relationships changes the others will need to adjust to the new context. This means the power of the citizen-consumer to set changes in motion as well as changes in hierarchy in terms of restructuring the city. Change often requires time, and adaptation, while citizen-consumers are driven by convenience and saving time motives. The adjustments in ordering practices can create intentional motivation among food delivery platforms, possibly leading to innovations as to reduce the impact on the city, which will eventually benefit the citizen-consumer. This presents the paradox of the desirable world.

6. Conclusion

In this final chapter an answer to the question: *'What does the rise of last-mile food delivery platforms mean for the city and urban planning?'*, is given and future research suggestions, policy recommendations, and limitations of this research are also discussed here.

The operations of food delivery platforms raise socio-spatial matters. The increase of logistic transport circulations confronts Amsterdam with increases in the density of roads, congestion and pollution in addition to the urban challenges, such as urbanization and climate change, pose. In terms of urban planning these concerns are recognized by including city logistics into policies. However, by the responsive approach of the municipality the transport circulations of the last-mile of the food delivery platforms are not recognized as city logistics in the policies set or yet to be set. This exclusion, and the rapid emergence of various food delivery platforms in the city, results in a policy gap. The operations of food delivery platforms reform the city in terms of the division of space, especially within the city boundaries. The food delivery operations on city scales depend on the appropriate availability of logistic facilities and DC locations across the city. In addition to this, the practices of bicycle deliverers across the city take on space in terms of sidewalks and bicycle paths. With regard to urban planning, the city needs to address the needs for facilities of the food delivery platforms, whilst needing to balance of the division of space and road safety. The municipality sets area-based regulations as to comply with international cooperation, and policy goals regarding to increase the liveability and sustainability by reducing climate change effects. The food delivery platforms need to comply with low emission-zone restrictions. Alternative transport modes are stimulated, whilst the capacity of these transports does not meet the capacities of the regular transport, yet. In addition to this paradox of transport, the transition towards alternative means of transport is constrained by the high costs for both the municipality and the food delivery platforms. This has proven to be an additional challenge for urban planning. Cooperation between both parties can play key role in finding appropriate solutions. The threat of food delivery platforms towards traditional dining establishments and physical stores is both a socio-spatial as well as a socio-material matter. The concerns for these city functions tend to disappear because of ordering practices, as these are recognized by citizen-consumers. However, this concern is not reflected in the expectations of their ordering practices for the upcoming 5 years.

As citizen-consumers expect their ordering practices to increase, the municipality should take this into account for urban planning.

The research focused on the reactions of the citizen-consumers and the municipality on the rapid emerging food delivery platforms, in terms of ordering practices and experiences concerning physical features of the city and municipal discussions and regulations. Therefore, the concerns in the literature with regard to data-acquisition and privacy are not addressed in this research. This is an opportunity for further research. Another suggestion for future research is a comparative case study research for another city. Both national and international cities would be interesting to research as the context of the city determines the outcome of the study. City contexts depend on both national and local aspects (e.g., cultural, spatial, economical etc.). In addition, researching governments and governance concerning the operations of the food delivery platforms with a focus on transitions to alternative means of transport is interesting because of the financial constraints. A concluding research suggestion is a reflectional analysis of the actual impact on the city logistic policies. This can provide an in-depth knowledge about the successes and shortcomings.

6.1 Policy recommendations

For planning a liveable and sustainable city, I suggest to that municipalities need to have a clear long-term vision and strategy on city logistics by cross-linking the various municipal departments. By taking the rapid rise of food delivery platforms and the future demand of the citizen-consumers into account, this general vision and strategy should include the last-mile of food delivery platforms. An allocation of the last-mile of food delivery platforms to the existing logistical categories (i.e., service and parcel logistics) is necessary. In my opinion, a separate category for this is not necessary because this category is already covered by the food delivery platforms perform existing e-commerce business models (i.e., Bricks and Clicks and Pure-play E-tailers). The categorisation of the food delivery sector, into parcel and service logistics, could perhaps monitor the consequences and impact for the city somewhat better. This monitoring should include the mapping of city logistic problems posed by the food delivery platforms.

This is a useful method to determine *'what problems the municipality needs and wants to solve and what the municipal goals contain'*, across the various departments of the municipality. This would tackle the responsive attempt of policy making and the splintered policies for city logistics. The emphasis that I would like to give, is to involve both larger and smaller food delivery operators, as it is more difficult for smaller parties to implement efficient logistics due to a lack of knowledge. This requires good communication from both sides however, that might prove to be a pitfall that will be hard to encounter.

6.2 Limitations

First, this research is limited by research circumstances, due to the Covid-19 pandemic. The interviews needed to be conducted online. This made ensuring reliable data collection a challenging prospect. However, conducting these interviews via video calls also created opportunities. It was possible to record the video calls, which allowed for the interpretation of body language as it could be seen and analysed. The second limitation concerns the reflection of citizen-consumers views across the city. Although the research attempted to represent a broad coverage of the citizen-consumers views, by distributing the QR-code in various areas in Amsterdam, the results did not cover an equal distribution of representation of all the city areas. The post code areas 1060 – 1069 and 1100 - 1109 are thus underrepresented in the results of this study (appendix 6).

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Appendices

Appendix 1: Transcript coding book

- **Corona**

- **Platforms**
 - Features
 - Own platform
 - Other platforms

- **Delivery and collection**
 - Method description
 - Days and times
 - Failed deliveries

- **Logistics**
 - Challenges
 - Parking
 - Dense roads
 - Safety
 - High costs
 - Infrastructural challenges
 - Regulations
 - Storage
 - Supply chain
 - Efficiency
 - Advantages and disadvantages

- **Operational scale**
 - Delivery range
 - Location distribution centre/hub
 - Neighbourhood scale
 - City scale
 - National scale

- **Transport mode**
 - (electric) Bikes
 - (electric) Vans
 - Cool elements in parcel vehicles
 - Collection transport

- **Sustainability**
 - Food waste
 - Bulking deliveries
 - Alternative transport

- **Policy**
 - Logistics
 - Mobility

Appendix 2: Policy analysis coding book

- **Logistics**
 - Infrastructural challenges
 - Loading infrastructures
 - Maintenance of quay walls
 - Logistic facilities
 - Safety
 - Heavy logistics
 - Weight restrictions
 - Time windows
 - Safety
 - Low emission
 - Transport modes
 - LEVV/EV
 - Hubs
 - Loading and unloading
- **Mobility**
 - Low emission zones
 - Exemptions
 - Infrastructural challenges
 - Loading infrastructures
 - Transport modes
 - LEVV/EV
 - Safety
 - Parking

Appendix 3: Mapping exercise

	Platforms	Product/Service Features	Dominant LNM	Operational Scale (OS)	Distribution Centres (DC)	Dominant Mode of Transport	Delivery Timeframe	Relationship Citizen-Consumer
Bricks and Clicks: Weekly groceries	Large companies: Albert Heijn, Deen, Dirk, Hoogvliet, Jubmo Lidl, PLUS & Spar	Home delivery focused on weekly groceries	Self-supporting model	National scale	Large DC's located in regional scale	Normal vehicle vans	7 days of the week. Booked time frame.	Online customer base from the long-term relationship of the physical shops: existing network
Pure-play e-tailers: Weekly groceries	Picnic & Crisp	Home delivery focused on weekly groceries	Self-supporting model	National scale	Large DC's located in regional scale	Electric vehicle vans	6 to 7 days of the week. Booked time frame.	Quality products & excellent last-mile delivery
Pure-play e-tailers: Daily groceries	Gorilla's, Flink, Zapp, Getir	Instant home delivery focused on daily groceries.	Self-supporting model	City scale	Small DC's on neighbourhood scale, which determines the operational range	(E)-Bikes	Instant delivery (10-20 min), variation between 8am and 11pm till 24-hours service	Customer loyalty by offering excellent services (24 hours, immediate delivery, late delivery refunds)
Local initiatives: Daily and weekly groceries	Local Heroes & Het Wijnhuisje	Home delivery and pick-up for products from local entrepreneurs and wines	Self-supporting model	City and neighbourhood scale	Small DC's on neighbourhood scale	Parcel E-bikes	3 to 6 days of the week. Booked time frame.	Promote the charm of personal attention, support of local entrepreneurs and artisanal products
Pure-play e-tailers: Subscription-based meal boxes	De Krat, Boerschappen, Eko Menu, Familiebox, Hello Fresh, Marly Spoon & Dinnerly	Home delivery of subscription-based meal box consisting of recipes with accompanying fresh ingredients	Self-supporting model	National scale	Large DC's located in regional scale	Normal vehicle vans	7 days of the week. Booked time frame.	Promoting sustainability in product cycles, organic and high-quality products, some of which are local
Local initiative: Non-subscription-based meal boxes	Boeren voor Buren	Meal-boxes with a composition B-quality vegetables and fruits for less fortunate families. Picking-up at four collecting points	Self-supporting model	City scale	Medium size DC located in Amsterdam and small collecting points on neighbourhood scale	Normal vehicle vans	Two times a month on Saturday (9:00 am - 1:00 pm)	Social initiative to provide less fortunate people with fresh fruit and vegetables at a lower price
Pure-play e-tailers: Take-away meals	Thuisbezorgd.nl, Deliveroo, UberEats, Rocket & Bolt	Instant home delivery and pick-up focused on take-away meals	Functions as outsourcing model for restaurants & dark kitchens	City scale	N.a.: The restaurant/dark kitchen locations determines the operational scale (3-kilometre range)	(E)-Bikes, scooters, cars owned by deliverers	Instant delivery, depending on opening hours of restaurants & dark kitchens	Facilitate connection between restaurant and consumer and guarantees quality on delivery rather than the product

Appendix 4: Survey (English version)

This survey is conducted by a student of the faculty Geosciences of Utrecht University for the completion of master's programme in Spatial Planning.

Thank you for taking the time and participation. As you may know, the online food industry is growing. Via online platforms food is ordered and delivered at the doorstep. Therefore, how recent rise in e-commerce and last-mile delivery of groceries, food boxes and takeaway meals is reshaping the city is investigated. In order to conduct a targeted study, specific initiatives in Amsterdam that contribute to this are looked at.

Your data will not be distributed and will be treated confidentially. If you have any questions of confidentially, you can contact: e.j.etty@students.uu.nl.

The survey contains takes about 5 - 10 minutes.

One answer is possible for the questions, unless stated otherwise.

Section 1: General information

1.1 Which postal code area do you live in?

- 1000 to 1019
- 1020 to 1037
- 1040 to 1047
- 1051 to 1059
- 1060 to 1069
- 1070 to 1079
- 1080 to 1087
- 1090 to 1098
- 1100 to 1109

1.2 What is your gender?

- Male
- Female
- Other

1.3 What is your age?

- 18 – 25
- 26 – 45
- 46 – 65
- 65+

1.4 What is your highest level of education?

- Primary education
- VMBO
- HAVO/ VWO
- MBO
- HBO/University Bachelor degree
- Master degree
- PhD

1.5 What is your occupation? (Multiple answers possible)

- Student
- Working part time
- Working full time
- Retired
- Unemployed

Section 2: E-groceries

Different services are introduced in the e-food market. To be specific:

Groceries mean the raw ingredients and non-prepared food. Food boxes mean boxes consisting of recipes and specific ingredients for this. Take-away meals mean prepared food in meals.

The following questions concern the purchase of groceries. Food boxes and take-away meals are excluded from the questions.

2.1 What is the **most important reason** to order groceries online?

- I've Never ordered groceries online
- It saves time
- It is delivered at home
- Special offers
- Not depended on opening hours of shops
- Other, please specify.....

If you do not order groceries online, please go to section 3.

2.2 How many times a month do you order groceries via online platforms? (via e.g., Gorilla's, Local Heroes, Crisp, AH.nl etc.)

- Almost never
- Once a month
- Once in two weeks
- Two to three times a week
- Once a week
- (Almost) daily

2.3 What is the highest number of times that you ordered groceries online on a single day in the past 3 months?

- I did not order more than once a day groceries online the past 3 months
- 1 > 3
- 3 > 5
- > 5

Different delivery options are introduced in the e-food market. To be specific: Home delivery means the delivery at the door. Click and collect means the collecting the online purchase at the store. Pick-up point mean collecting the purchase at a point other than the store.

2.4 Have you ever used home delivery for the delivery of groceries?

- Yes
- No

2.5 Have you ever used click and collect for the delivery of groceries?

- Yes
- No

2.6 Which mode of transport do you use for collecting your order with click and collect option? (Multiple answers possible)

- Walking
- Bicycle
- E-bike
- Car
- Public transfer
- Shared mobility
- Other, please specify.....

2.7 Have you ever used pick-up point for the delivery of groceries?

- Yes
- No

2.8 Which mode of transport do you use for collecting your order with pick-up point option? (Multiple answers possible)

- Walking
- Bicycle
- E-bike
- Car
- Public transfer
- Shared mobility
- Other, please specify.....

2.9 Which delivery option do you use the most often for the delivery of groceries?

- Home delivery
- Click and collect
- Pick-up point

2.10 Which day of the week do you choose most often for the delivery of groceries?

- Monday
- Tuesday
- Wednesday
- Thursday
- Friday
- Saturday
- Sunday
- I don't know

2.11 What timeslot do you select most often for deliveries of groceries? (Multiple answers possible)

- From 7 am to 10 am

- From 10 am to 1 pm
- From 1 pm to 4 pm
- From 4 pm to 7 pm
- From 7 pm to 9 pm
- From 9 pm to 11 pm
- I don't know

2.12 On a scale from 1 to 7, 1 most unimportant and 7 is most important. How important is sustainable transport mode when ordering groceries online?

	1	2	3	4	5	6	7	
<i>most unimportant</i>	0	0	0	0	0	0	0	<i>most important</i>

Section 3: Meal boxes

Different services are introduced in the e-food market. To be specific: Groceries mean the raw ingredients and non-prepared food. Meal boxes mean boxes consisting of recipes and specific ingredients for this. Take-away meals mean prepared food in meals.

The following questions concern the purchase of meal boxes. Food to be prepared and take-away meals are excluded from the questions.

3.1 What is the **most important reason** to food boxes online?

- I've never ordered meal boxes online
- It saves time
- It is delivered at home
- Special offers
- Not depended on opening hours of shops
- Other, please specify.....

If you do not order food boxes, online please go to section 4.

3.2 How many times a month do you order food boxes via online platforms? (via e.g., Hello Fresh, Marley Spoon, De Krat, Dinnerly etc.)

- Almost never
- Once a month
- Once in two weeks
- Two to three times a week
- Once a week
- (Almost) daily

3.3 For how many meals a week do your order the meal boxes?

- 1 > 3

- 3 > 5
- > 5

Different delivery options are introduced in the e-food market. To be specific: *Home delivery* means the delivery at the door. *Click and collect* means the collecting the online purchase at the store. *Pick-up point* mean collecting the purchase at a point other than the store.

3.4 Have you ever used home delivery for the delivery of meal boxes?

- Yes
- No

3.5 Have you ever used click and collect for the delivery of meal boxes?

- Yes
- No

3.6 Which mode of transport do you use for collecting your order with click and collect option? (Multiple answers possible)

- Walking
- Bicycle
- E-bike
- Car
- Public transfer
- Shared mobility
- Other, please specify.....

3.7 Have you ever used pick-up point for the delivery of meal boxes?

- Yes
- No

3.8 Which mode of transport do you use for collecting your order with pick-up point option? (Multiple answers possible)

- Walking
- Bicycle
- E-bike
- Car
- Public transfer
- Shared mobility
- Other, please specify.....

3.9 Which delivery option do you use the most often for the delivery of meal boxes?

- Home delivery
- Click and collect
- Pick-up point

3.10 Which day of the week do you choose most often for the delivery of meal boxes?

- Monday
- Tuesday
- Wednesday
- Thursday
- Friday
- Saturday
- Sunday
- I don't know

3.11 What timeslot do you select most often for deliveries of meal boxes? (Multiple answers possible)

- From 7 am to 10 am
- From 10 am to 1 pm
- From 1 pm to 4 pm
- From 4 pm to 7 pm
- From 7 pm to 9 pm
- From 9 pm to 11 pm
- I don't know

3.12 On a scale from 1 to 7, 1 most unimportant and 7 is most important. How important is sustainable transport mode when ordering groceries online?

	1	2	3	4	5	6	7	
<i>most unimportant</i>	0	0	0	0	0	0	0	<i>most important</i>

Section 4: Take-away meals

Different services are introduced in the e-food market. To be specific: Groceries mean the raw ingredients and non-prepared food. Meal boxes mean boxes consisting of recipes and specific ingredients for this. Take-away meals mean prepared food in meals.

The following questions concern the purchase take-away meals. Food to be prepared and food boxes are excluded from the questions.

4.1 What is the **most important reason** to order take-away meals online?

- I've never ordered takeaway meals online
- It saves time
- It is delivered at home

- Special offers
- Not depended on opening hours of shops
- Other, please specify.....

If you do not order take-away meals, online please to section 5.

4.2 How many times a month do you order take-away meals via online platforms? (via e.g., Uber Eats, Just Eat, Deliveroo etc.)

- Almost never
- Once a month
- Once in two weeks
- Two to three times a week
- Once a week
- (Almost) daily

4.3 What is the highest number of times that you ordered groceries online on a single day in the past 3 months?

- I did not order more than once a day takeaway meals online the past 3 months
- 1 > 3
- 3 > 5
- > 5

Different delivery options are introduced in the e-food market. To be specific: *Home delivery* means the delivery at the door. *Click and collect* means the collecting the online purchase at the store. *Pick-up point* mean collecting the purchase at a point other than the store.

4.4 Have you ever used home delivery for the delivery of takeaway meals?

- Yes
- No

4.5 Have you ever used click and collect for the delivery of takeaway meals?

- Yes
- No

4.6 Which mode of transport do you use for collecting your order with click and collect option? (Multiple answers possible)

- Walking
- Bicycle
- E-bike
- Car
- Public transfer

- Shared mobility
- Other, please specify.....

4.7 Have you ever used pick-up point for the delivery of takeaway meals?

- Yes
- No

4.8 Which mode of transport do you use for collecting your order with pick-up point option? (Multiple answers possible)

- Walking
- Bicycle
- E-bike
- Car
- Public transfer
- Shared mobility
- Other, please specify.....

4.9 Which delivery option do you use the most often for the delivery of takeaway meals?

- Home delivery
- Click and collect
- Pick-up point

4.10 Which day of the week do you choose most often for the delivery of takeaway meals?

- Monday
- Tuesday
- Wednesday
- Thursday
- Friday
- Saturday
- Sunday
- I don't know

4.11 What timeslot do you select most often for deliveries of takeaway meals? (Multiple answers possible)

- Between 6 am to 12 noon
- Between From 12 noon to 4 pm
- Between From 4 pm to 9 pm
- Between From 9 pm to 1 am
- Between From 7 pm to 9 pm
- Between From 1 am to 5 am
- I don't know

4.12 On a scale from 1 to 7, 1 most unimportant and 7 is most important. How important is sustainable transport mode when ordering groceries online?

	1	2	3	4	5	6	7	
<i>most unimportant</i>	0	0	0	0	0	0	0	<i>most important</i>

Section 5: COVID-19

5.1 What has been the impact of Covid-19 on the frequency of your online ordering behaviour of groceries, food boxes and take-away meals?

- I ordered much less
- I ordered less
- I ordered about the same
- I ordered more
- I ordered much more

Please go to section 5.2 if you never ordered groceries, food boxes or take-away meals.

5.2 What was the **most important reason** to order restaurant boxes online?

- I've never ordered restaurant boxes online
- It saves time
- It is delivered at home
- Special offers
- Not depended on opening hours of shops
- Other, please specify.....

Section 6: Future

6.1 Do you expect to order more or less frequent online groceries, food boxes or take-away meals in the next 5 years?

- Much less
- Less
- About the same
- More
- Much more

6.2 Why do you think you will order more or less frequent online groceries, food boxes or take away meals in the next 5 years?

.....

.....

.....

6.3 Do you expect to go to the physical food stores (e.g., grocery shops and take-away restaurants) more often or less often in the next five years?

- Much less
- Less
- About the same
- More
- Much more

6.4 Why do you think you will go more often, less often or about the same to the physical food stores (e.g., grocery shops and take-away restaurants) in the next five years?

.....

.....

.....

Section 7: Affecting the city

7.1 Do you think delivery of online groceries, food boxes and take-away meals is affecting the city?

- Yes
- No
- I don't know

7.2 How many times per week do you experience food-delivers in physical features of the city? (this includes groceries, food boxes, take-away meals etc.)

	Almost never	Once a month	Once in the two weeks	Two - three times a week	Once a week	(almost) daily	I don't know
My street							
Sidewalk							
Bicycle path							
Road							

7.3 Why does the delivery of online groceries, fresh meal boxes and takeaway meals affect the city or not?

.....

.....

.....

.....

 7.4 To what extent is the delivery of online groceries, food boxes and take-away meals a negative or positive effect for the following physical features of the city?

	Very negative	negative	Neutral	positive	Very positive	I don't know
Sidewalk						
Bicycle path						
Road						
Parking						

7.5 Do you have any thoughts about online food deliveries affecting the city?

- Yes, please specify why:

.....

- No

End of the survey.

Thank you for participating.

Appendix 5: Survey QR-code flyer (English version)



Universiteit Utrecht

City reforms by the rise of online ordering and home delivery of groceries, meal boxes and takeaway



Dear Sir / Madam,

Food is ordered and delivered to your doorstep via online platforms. Therefore, this research focus on how the recent increase in e-commerce and last-mile delivery of groceries, fresh meal boxes and takeaway meals is changing the city.

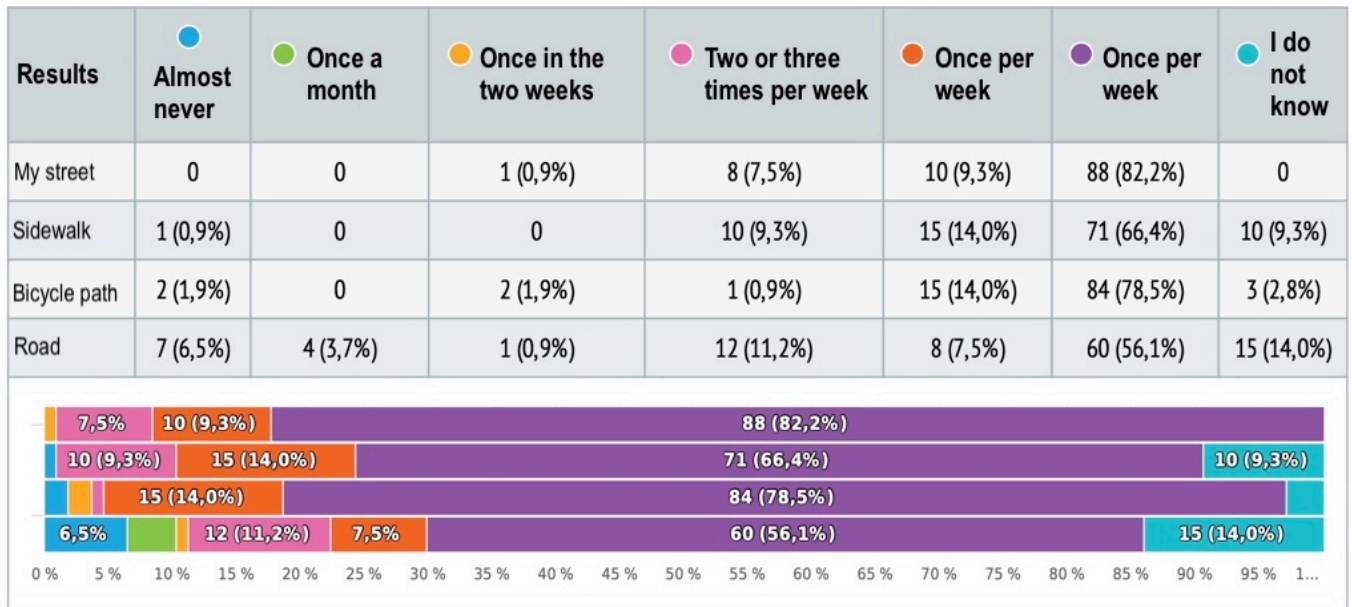
Thank you for your participation!

Duration: 5 - 10 minutes

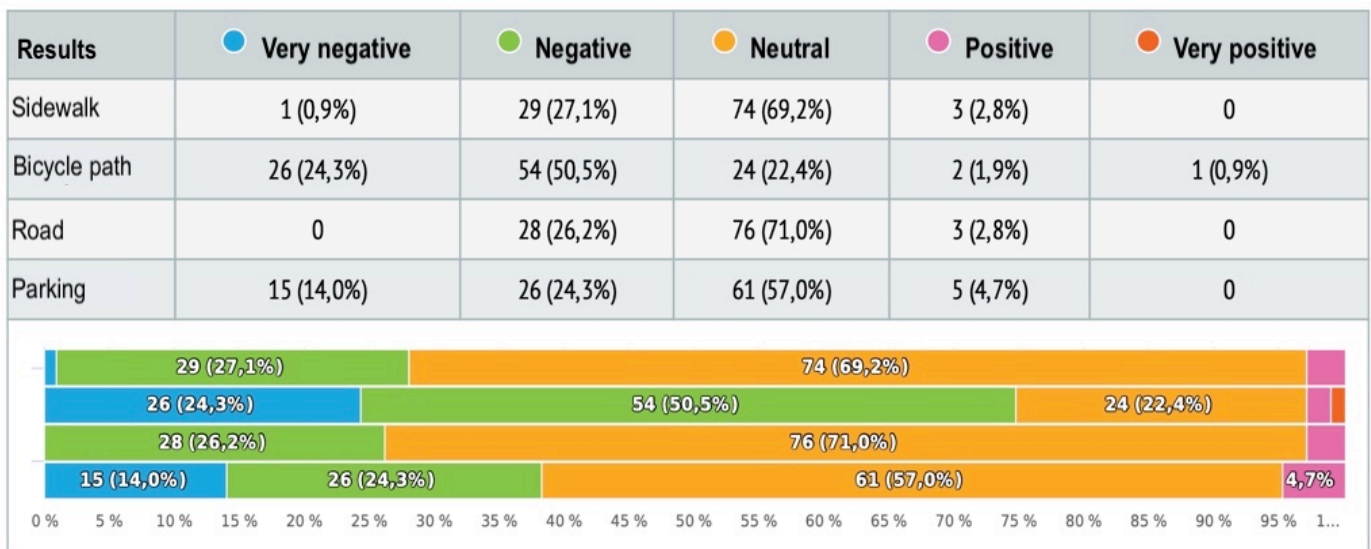
Your data will not be distributed and treated confidentially. For questions about confidentiality, please contact: e.j.etty@students.uu.nl.

Appendix 6: Results survey

Title: Experiences of the frequency of the food deliverers in the physical features of the city



Title: Impact of food delivery on physical features of the city



Title: Representatives of the participant's postcode areas

	Answer	Ratio
● 1000 to 1019	14	13,1%
● 1020 to 1037	14	13,1%
● 1040 to 1047	11	10,3%
● 1051 to 1059	11	10,3%
● 1060 to 1069	5	4,7%
● 1070 to 1079	20	18,7%
● 1080 to 1087	10	9,3%
● 1090 to 1098	15	14,0%
● 1100 to 1109	7	6,5%

