



**UNIVERSITY OF GOTHENBURG**  
**SCHOOL OF BUSINESS, ECONOMICS AND LAW**

# **The Final 50 Feet Problem in Gothenburg**

A MAMCA study on the situation regarding deliveries to multi-tenant multistory buildings in Gothenburg

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## Abstract

Purpose:	The purpose is to study the situation regarding the Final 50 Feet in Gothenburg and if any of the solutions found in literature can be implemented. As there are several actors connected to deliveries with diverging goals a Multi-Actor, Multi-Criteria Analysis (MAMCA) has been used to include the views of the different stakeholders to increase the feasibility and ensure that the results are legitimate and feasible to implement.
Theory:	The Final 50 Feet is a new area of research and is connected to the wider scope of city logistics as it operates within it. The typology of city logistics down to Final 50 Feet has been used to gain a holistic view of the effects of the presented solutions. The Large Traffic Generators (LTGs) create demand and are the area of focus as they generate the most trips and can therefore lead to the largest effect if the delivery situation would have been improved. Documents from the municipality regarding how they want freight to be conducted is seen as the legislative side of the framework. MAMCA has been used to merge the different views of all stakeholders to explain their position and rank the solutions.
Method:	The study is of an exploratory nature as the research subject has never been studied in Gothenburg. Interviews with the stakeholders is the primary data source as well as field observations with the distribution drivers. The solutions and theory regarding Final 50 Feet research were used to design a MAMCA where the nuances of the different stakeholders could be measured against each other.
Result:	The stakeholders have diverging views about the solutions from their various perspectives and within the same stakeholder group. For each solution there are both winners and losers as the costs and benefits are not equally distributed between them. There is a stalemate between the stakeholders and not much is being done at the moment. The general level of understanding regarding how freight is performed and what chain reactions that result from changes is lacking and the drivers who sit on the knowledge regarding this are seldom asked to contribute. More cross-business discussion and coordination is required for Gothenburg to reach the city center as stated in the transport plan.
Keywords:	Final 50 Feet, Large Traffic Generators, City Logistics, MAMCA, Freight Quality Partnerships, Transport Plan, Vertical Movement, Horizontal Movement, Urban Freight, Distribution, Collection, Tenants, Receivers.

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# 1. Introduction

Cities may be considered as places of high consumption of various goods and services. They consist of various businesses requiring all sorts of materials for their operations as well as of inhabitants with their own individual needs. In order for a city to work, it needs to contain all of these materials, products and services being distributed to the places where the consumption can be made. In addition, increasing customer demand for new services is making city distribution to grow. Online retailing and instant deliveries have gained a significant place as a support function for the cities in terms of providing goods and making consumption easier with customer oriented services such as home deliveries and installation services. Sweden, for instance, has experienced growth in e-commerce of 13% during the year 2019, growing annually by similar proportions the previous years as well (PostNord, Svensk Digital Handel & HUI Research, 2020). In Paris, it has been estimated that instant deliveries already account for 2,5% of total deliveries in the city whilst generating a significant amount of trips (Dablanc, Morganti, Arvidsson, Woxenius, Browne & Saidi, 2017). Since the city is a point of consumption, this consumption has to be supported by sourcing and distribution. Sourcing, being a part of various supply chains generates transportation. A supply chain consists of several logistics activities, spanning from obtaining raw material for production to delivering the finished product to the customer. Transportation is a function within certain logistics activities which focuses on physically moving goods from one place in the supply chain to the next, in order to perform the next activity in the supply chain, such as processing, assembly and warehousing. Transportation within a logistics activity may be done using several modes of transport and is based on moving freight.

In the context of freight transport operations within the city, known as city logistics, logistics are viewed as a system in the urban context and includes decision-making processes for applying policies regarding transportation within a city (Cardenas, Borbon-Galvez, Verlinden, Van de Voorde, Vanelslender & Dewulf, 2017). A subset of these operations is urban freight transport, which focuses on deliveries of goods and vehicle movement (Anand, Van Duin, & Tavasszy 2014). Further, logistics operations in terms of transportation in cities are often connected to the last mile domain, which is a term for the last leg of the delivery of a finished product to the customer (Cardenas et al., 2017). This is the case since a city, being a large point for consumption is also subsequently a place where a lot of distribution is being made, since a large proportion of the consumers is there. The last mile operations account for as much as 28% of total transport cost (Goodman, 2005). They are problematic due to a fundamental imbalance between customer requirements and efficient delivery operations by the logistics provider. Customers require short lead times and short delivery windows while the logistics providers desire the opposite. Other problems encountered in this domain are failed deliveries and long delivery times (Kim, Boyle, & Goodchild, 2018). As the model for urban deliveries often consists of a warehouse in proximity to the city, it results in several problems such as low vehicle



utilization due to dispersed customers and a large number of vehicles delivering to the same retailer (Faccio & Gamberi, 2015). These problems are important since transportation activities, regardless of the mode of transport chosen for executing deliveries, generate negative externalities such as congestion, emissions and noise, while low vehicle utilization also contributes to poor energy efficiency (Cardenas et al., 2017). Consequently, negative externalities such as congestion worsens conditions for punctual deliveries and overall transportation in a city. Additional time required for deliveries will be passed onto the consumer while also increasing fuel consumption of the delivery vehicles. An estimation states that during the year 2010 in US, travelers experienced 4,8 billion hours of delays, using additional 7,2 million liters of fuel (1,9 million US gallons) with a total cost of 101 billion dollars due to congestion (Jaller, Wang, Holguín-Veras, 2015). Time and increasing fuel consumption will further increase the costs of doing business in the city as well as making it a less attractive place to live in (Seattle Department of Transportation, 2016).

Last mile deliveries is a rather discussed topic within the logistics literature. Apart from the financial aspect, it is also considered to be the most inefficient part of the supply chain (Kin, Spoor, Verlinder, Macharis & Van Woensel, 2018). It is becoming harder to keep these operations profitable and reliable due to the already mentioned low vehicle utilization and empty trips after completed deliveries. Empty trips are not necessarily applied in all of the distribution. However, since most of the consumption is taking place in the city, the collected goods from the city will not outweigh the incoming goods in most cases and delivery vehicles will return to depots empty (Taniguchi & Thompson, 2015, p.142). In the EU for instance, 20% of all trucks run empty, while in some EU nations, the number is as high as 25% (European Commission, 2014). Last mile deliveries, although concerning the last leg of the goods movement to the point of consumption, terminates at the place where the delivery vehicle stops in proximity to the customer in order to execute the delivery. The following process of the physical delivery outside of the vehicle by the driver is not discussed.

The delivery process following after the delivery vehicle has stopped is of no less importance since it has direct consequences on the traffic situation on the city streets. Depending on how efficient the delivery process may be executed after the vehicle has stopped and parked, will determine the time during which it will occupy a loading zone, a parking space or space on the street outside the customer in general. Since the cities are becoming more densely populated while customers, simultaneously being inhabitants of the city, have increasing demands for on-demand shopping, this part of the delivery also needs to be considered (Goodchild & Ivanov, 2017). The researchers have identified this problem, referring to these kinds of delivery activities as the *Final 50 Feet* which is a continuation of the delivery process where the last mile ends, when the freight vehicle has parked for delivery. Activities included in the Final 50 Feet problem are spanning from goods movement on the curb and the vertical & horizontal movement within the receivers building (Kim et al., 2018).

The importance of the Final 50 Feet problem becomes clearer when considering the overall delivery operations. A general characteristic of city distribution is that vehicles are standing still most of the time, while deliveries are being made. A study based on parcel delivery vehicles was conducted in London, which revealed that 62% of the time the vehicles observed were parked as deliveries and collections were made (Allen et al., 2018). Most of the deliveries and pickups are predominantly done by walking. Since the last mile operations are costly and time inefficient, the delivery operations after the vehicle has stopped, need to be considered. The reason why such considerations are required is the need of reduction of this dwell time, resulting in poor utilization of street space and loading zone productivity (Goodchild & Ivanov, 2017). Congestion issues are even more prevalent due to characteristics of delivery operations within a city. The parcel delivery sector for example is characterized by many players with poor vehicle utilization (Allen et al., 2018). The number of parking spaces or space on the street is thus usually limited while the pressure on the loading zones is high since most of the deliveries are being made during peak hours (Sánchez-Díaz, Georén, & Brolinson, 2017). In addition, in Sweden, traffic regulations are used for parking spaces, often reserving those as loading zones during a limited period of the day (Trafikanalys, 2017).

## **1.1 Problem description**

One of the cities which is becoming more densely populated is Gothenburg. Several major infrastructure projects are being executed simultaneously while a lot of new real estate is being built. The city is expecting to grow with 150,000 inhabitants while 80,000 new jobs are planned to be created by 2035 (Göteborgs Stad, 2014). The city has comprised a transport strategy for itself in terms of what needs to be done in order to make this development in terms of growth possible. Objectives of this plan are: *making Gothenburg an accessible regional center, creating an attractive urban space and a vibrant urban life* and *making Gothenburg the logistics center of Scandinavia* (Göteborgs Stad, 2014). As a lot of construction is taking place in the city, partly in order to reach those goals, the traffic space is becoming ever more scarce, creating additional congestion. A city striving to become more attractive for its citizens and guests needs to deal with the congestion. If the city is going to be more densely populated, it has to reconsider its policies in terms of freight distribution since it does generate a lot of vehicle movement. The city of Gothenburg has comprised a strategy mentioned above. However, this strategy does not discuss the delivery operations on the curb space nor within the buildings. Thus, horizontal and vertical goods movements are disregarded. The overall discussion regarding urban deliveries is very limited in size comparing the rest of the strategy. Gothenburg, being a city with a significant amount of businesses and inhabitants in the city center, risks failing to take a rather important factor into account, the Final 50 Feet of urban goods distribution. The issue becomes even more prevalent considering the amount of new buildings being constructed in the city. Multi-tenant multistory buildings accommodating various businesses, generate considerable amounts of deliveries. According to research from New York, 56 buildings in Manhattan out of a million

buildings in the city, generated as much as 4% of all deliveries in the city daily (Jaller et al., 2015). In order to reduce congestion, the logistics operations within buildings need to be considered.

Another reason why the issue is important is existing freight vehicle restrictions which have been applied in the city during the last years. A number of streets have been rebuilt in order to give way for public transport, cyclists and pedestrians as a part of a vision for the city (Göteborgs Stad, 2018). Several streets have been converted to one-way traffic, received new loading zones and axle-weight limits. For instance, in the inner city of Gothenburg, there is a ban for vehicles over 3,5 tones entering between 11 and 17 o'clock (Behrends, 2019). Around the same time, in the year 2013, the city applied its congestion charge. In addition, Gothenburg has a low emission zone as well. All of this was done in an effort to reduce traffic in the city, encouraging more people to leave the car at home. Simultaneously, these efforts have made the delivery operations within the city more difficult, with even shorter delivery windows. This further highlights the importance of reducing dwell times related to urban freight distribution, which is the reason why the Final 50 Feet consideration is required. Finally, poorly adjusted street space and internal space of the buildings has a great impact on the horizontal and vertical movement of the goods, jeopardizing the efficiency of distribution operation. Poorly adjusted infrastructure of streets and buildings also has an impact on the delivery driver, resulting in a difficult working environment and potential work related injuries. Thus, the reasons for considering the Final 50 Feet of urban goods distribution are several.

## **1.2 Research question**

This thesis aims at studying the situation regarding the Final 50 Feet in Gothenburg. The study is set on multi-tenant multistory buildings receiving deliveries daily. In the scope of this thesis, multi-tenant multistory buildings are regarded as buildings containing multiple businesses or organizations operating under the same roof. As the city is planned to include more space for walking, cyclists and public transport while also becoming more densely populated, freight patterns being the lifeblood of the city have to be considered. This thesis will examine how deliveries are taking place in the city from the horizontal and vertical goods movement perspective in regard to the buildings receiving goods. The investigation will be based on a multi-actor approach in order to obtain a broad view on the issue. This thesis is expected to provide the reader with a view regarding whether the issue of the Final 50 Feet of urban goods distribution is persistent in Gothenburg and what can be done about it as well as which parties are the ones being able to make a change. In regard to the discussion above and chosen geographical context, this thesis will be focused on answering the following questions:

- What problems exist in Gothenburg for efficient Final 50 Feet of urban goods distribution from different stakeholder perspectives?

- Which solutions are perceived as feasible alternatives by the different stakeholders to the Final 50 Feet issues found in Gothenburg?

The thesis will be based on interviews with relevant actors such as logistics providers and their drivers, representatives from the municipality, property owners and receivers of goods in order to get a full insight on the issue. In addition, secondary data will be used in terms of relevant policies, guidelines and publications made by the municipality of Gothenburg and other relevant parties. The thesis is solely focused on deliveries received by businesses since they are the biggest generators of deliveries, especially when located together with other businesses.

### **1.3 Delimitations**

In order to keep this thesis concrete, some topics have had to be excluded. As this thesis focuses on operational efficiency in the last part of the distribution, the environmental perspective of urban freight is largely ignored. Due to the focus of this thesis being to look at the operations of delivering to businesses in multi-tenant multistory buildings, the topic of e-commerce to private citizens is excluded as these receivers are dispersed. As the situation of the Final 50 Feet is unique to every location the geographical scope of this thesis is limited to Gothenburg. Lastly, the Final 50 Feet of urban goods distribution is intertwined with the larger scope of city logistics and the other dimensions to how distribution in a city functions. The focus in this thesis is on these Final 50 Feet while still acknowledging the role the other dimensions play and where the Final 50 Feet is positioned in relation to them.

## **2. Theoretical framework**

*Firstly, the outline of the research will be presented with a framework constructed for the research in order to explain the relation between the various theoretical parts. Followed by the introduction to the subject of city logistics with the underlying subjects of urban goods distribution, last mile and Final 50 Feet of urban goods distribution. Later, solutions for the Final 50 Feet operations will be presented followed by generators for logistics demand in the urban context. Furthermore the municipality rules and guidelines as well as freight plans will be explained. Lastly, MAMCA as an analytical tool used in this thesis will be presented followed by a brief summary and critical discussion of the literature.*

### **2.1 Outline of the research**

Below (figure 1), the theoretical framework used for this study is outlined. City logistics is the subject considering logistics activities at macro level. Urban goods distribution is a part of city logistics which considers transportation activities in an urban context at meso level, as goods are entering the city through consolidation and cross-docking facilities. The final distribution

reaching the end customer of goods is defined as last mile deliveries, which is a part of urban goods distribution. The main topic of this thesis is the concept of Final 50 Feet, a recently defined subset from last mile deliveries, considering the final distribution tasks taking place when a distribution vehicle has stopped in proximity to the customer. Multi-tenant multi-story office buildings are regarded as large traffic generators and represent the demand side for distribution, what initiates last mile deliveries and consequently Final 50 Feet delivery operations in order for the goods to reach its customers. Freight plans and guidelines provided by the municipality is the governing stakeholder, managing these types of deliveries in the urban context. Various solutions are provided by the literature regarding the Final 50 Feet issue. These solutions are tested in the form of a discussion with the various stakeholders such as logistics providers, municipality and acting stakeholders linked to office buildings with the help of MAMCA, an analytic tool set to compile their views corresponding to their objectives as stakeholders. As MAMCA helps to gather the opinions of the stakeholders included, the tool facilitates emergence of conclusions considering the standpoints of each of them.

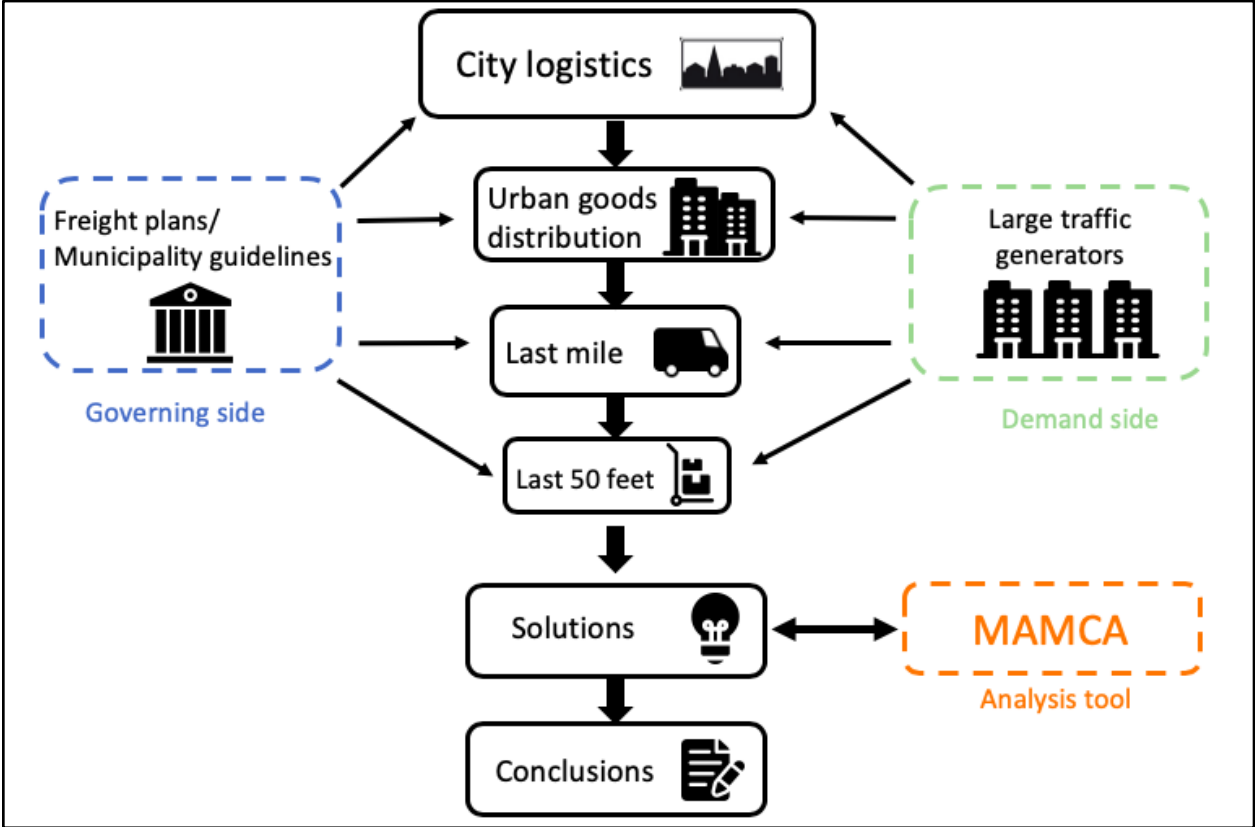


Figure 1. The model for the theoretical framework of the thesis.

## 2.2 Urban logistics

*Distributing goods in an urban environment is a nuanced and complex phenomena which contains several aspects and basis for analysis depending on which viewpoint that is taken by the*

*researcher. The following section will explain the typology of distribution in urban areas and how analysis differs depending on which viewpoint that is chosen. The section will end with a description of the goals of studying the Final 50 Feet of urban goods distribution.*

### **2.2.1 City logistics**

In the hierarchy of urban logistics, city logistics is at the top and concerns the macro level of decisions and analysis (Cardenas et al., 2017). Key characteristics for the domain of city logistics is the high number of stakeholders and the heterogeneity of their needs, which in turn has led to the service of distributing freight in urban areas battling with economic sustainability (Macário, Galelo & Martins, 2008). City logistics deals with urban freight distribution from a holistic viewpoint and deals with actors, norms, context and operations within city jurisdiction as well as the relationships with neighboring cities (Cardenas et al., 2017). Stakeholders that are included in this perspective are the citizens, carriers, shippers, receivers and the public authority. From this macro perspective the function of city logistics is to ensure that all stakeholders affected by urban freight distribution share both the beneficial and non-beneficial outcomes (Cardenas et al., 2017).

When researching city logistics the time perspective is often long and sustainability is an important concept. The objective of city logistics is to improve the possibilities of distributing freight in the city and at the same time pursuing a better quality of life for the inhabitants (Cardenas et al., 2017). The public decision context is an aspect of city logistics, with aspects such as regulatory readiness, competence at the decision making level and the level of engagement from affected stakeholders being important to take into consideration (Balm, Browne, Leonardi & Quak, 2014; Lindawati, Van Schagen, Goh & Souza, 2014; Lindholm, 2014). At the macro perspective the analysis includes the decision-making processes of creating public policy while further down the hierarchy of urban logistics the focus is on the compliance of these policies (Cardenas et al., 2017). Common methodologies for researching the complexity of heterogeneous needs of the stakeholders of city logistics are multi-actor analysis, evaluating decision-making processes and socio-economic impact assessment at the city level. Due to the difficulty of integrating the operational aspects together with the public policy process, qualitative measures are frequently used (Cardenas et al., 2017).

### **2.2.2 Urban goods distribution**

Urban goods distribution is on the meso level of urban logistics and has been defined as “the transport of goods by means of a wheeled vehicle, and the activities related to this transport towards or within an urban environment” (Fernandez-Barcelo and Campos-Cacheda, 2012). Urban goods distribution thus geographically begins as the goods enter the city through the facilities used for sorting and consolidating. Examples of issues being investigated are unloading practices, pollution, noise and congestion (Cardenas et al., 2017).

The methodology for analyzing urban goods distribution is both quantitative and qualitative (Cardenas et al., 2017). Simulations of traffic and goods flows are also used in order to try to optimize processes and the external costs associated with urban distribution. Aspects that are analyzed under this paradigm are the monetary and external costs of distribution activities, the impact of public policies on urban freight transport and traffic flows, location decisions, network design and the interaction between freight vehicles and private cars.

Public policies are evaluated under urban goods distribution but due to differing needs and costs between stakeholders in different urban areas, quantitatively analyzing the effect of public policies have proved itself complicated (Cardenas et al., 2017). Similar issues with lack of understanding by the involved stakeholders has also been found in Sweden (Behrends, 2019). However, these analyses are still important when public authorities are choosing between different measures (Cardenas et al., 2017).

### **2.2.3 Last mile**

Last mile distribution concerns the micro level of urban logistics and focuses on the operations of goods distribution within the urban area. The last mile refers to the part of the transport in which the goods reach their consumption point or the beginning of the transport where they are picked up at their origin and until they have reached a location where they are bundled. The main characteristics of last mile distribution is the problem of multi-drop or multi-collection routing problems and accessibility to certain urban areas lacking the necessary logistics infrastructure to handle today's frequent deliveries (Cardenas et al., 2017). Growing e-commerce magnifies these problems further as ordinary citizens and business may order unlimited quantities of goods from many different vendors, challenging the freight situation in urban context even more (Holguín-Veras, J., Amaya Leal, J., Sánchez-Díaz, I., Browne, M., & Wojtowicz, J., 2018). As the morphology of a city has huge implications for the potential of last mile distribution in a certain city, results from other cities should be applied with caution (Cardenas et al., 2017).

The main objective of research into last mile distribution is cost-efficiency, as it is the most costly part of the delivery accounting for 28% to 50% of total logistics costs (Goodman, 2005; McCrea, 2016). However, the external costs are not expected to rise for the sake of eliminating economic costs (Cardenas et al., 2017). An added objective is the distribution of costs and benefits between all affected stakeholders. Cardenas et al. (2017) state that last mile problems are often studied with mathematical models, both simulations and also pure cost functions. Some of the parameters that are accounted for in these models are: vehicle capacity usage, amount of kilometers travelled, fuel consumption, number of stops, loading costs, operation times and environmental measurements.

### 2.2.4 Final 50 Feet

In the last few years a new subset of last mile distribution has emerged called *the Final 50 Feet*. This topic of research of the distribution chain starts when the distribution vehicle stops in the loading bay of a building, curbside or alley and ends when the delivery or collection has been completed (Goodchild & Ivanov, 2017). In this domain the vertical space in cities should be analyzed together with the street network as a unified goods delivery system. The increase in e-commerce and parcel deliveries are reasons why this field has increased in importance.

The focus in this topic is on how the distribution driver moves on foot on the streets and in the building, both horizontally and vertically, with attention also being given to the distribution practices in the building (Goodchild & Ivanov, 2017). As much of the space used for parking the distribution vehicle during loading and unloading to trip generators in cities is public, how to best utilize this space is also of interest (Goodchild & Ivanov, 2017). Final 50 Feet is an area of distribution research that is under-explored considering the implications efficient distribution practices have on city logistics as a whole for a city (Goodchild & Ivanov, 2017). This is highlighted by the point that the time a distribution driver spends on foot can greatly exceed the time spent driving, with as much as 87 % of the time spent outside the vehicle in extreme cases (Kim et al., 2018). Thus, it is important to consider this part of the supply chain. When examining the description of Cardenas et al. (2017) together with the description of stakeholders within the Final 50 Feet issue by Goodchild & Ivanov (2017), there are a number of stakeholders which are frequently mentioned. These are presented in figure 2 below.

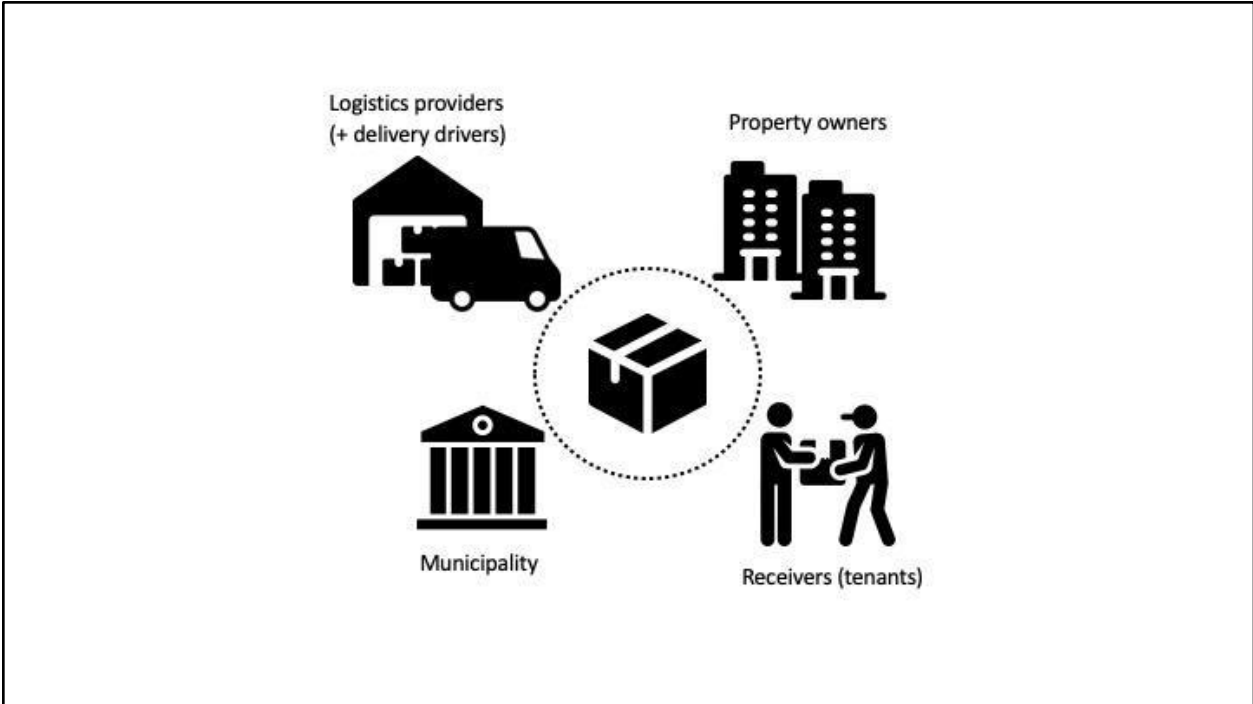


Figure 2. Stakeholders within the Final 50 Feet of logistics.



According to Goodchild & Ivanov (2017) the research into the Final 50 Feet has two distinct goals:

1. Reduce truck dwelling time and,
2. Reduce number of failed first deliveries.

There are both public and private benefits of reducing the two mentioned aspects by Goodchild & Ivanov (2017). The benefits of reducing the truck dwelling time are reduced costs for distribution companies which potentially can lead to lower prices to the customers. The load and unload space can be better utilized which facilitates more distribution activity without having to build more infrastructure. Also less circling around with the vehicle searching for free space to park while performing deliveries as loading space turns over more frequently.

Reducing the number of failed first deliveries improves the online shopping experience in urban areas and helps to protect retailers' brands (Goodchild & Ivanov, 2017). Less failed first deliveries also cut the costs for the retail and distribution companies and lowers the congestion in cities as a lower amount of failed first deliveries should translate into less distribution vehicles on the streets.

## **2.3 Possible solutions for the Final 50 Feet**

There exists a variety of alternatives to business as usual to increase sustainability and improve efficiency of urban logistics. They can be divided into three groups: *reduction of vehicle movement*, *efficient utilization of infrastructure* and *reduction of environmental impact of the vehicles* (Behrends, 2019). Only the first two groups of solutions are relevant for this thesis and will be presented below.

### **2.3.1 Reduction of vehicle movement**

Behrends (2019) provides a good summary of the concept of coordinated procurement as a way of reducing freight trips by cooperating in a building or business district to limit the amount of logistics providers operating in the area. By buying certain standardized products together such as office supplies, the amount of freight trips can be lowered and improve the utilization in freight vehicles. This leads to lower congestion on the streets as well as outside the building. Often these coordinated procurement initiatives start with waste management and evolve from there to incorporate deliveries. By having consolidated one part of the logistics flow opens up the discussion about delivery patterns and further consolidation of logistics.

The Department of Transportation in Seattle (2016) has investigated the possibility of using Intelligent Transport Solutions (ITS) to manage the curb space in real time. This is done by

collecting and using data continuously and presenting this to freight operators to aid in decision making or easing their passage in condensed city areas. The applications and uses can evolve as the technology progresses. Current examples of ITS applications being investigated in Seattle are loading zones that report to freight operators when they are free, wayfinding or route planning systems that update as the situation changes or traffic lights that prioritize freight vehicles over private cars.

### **2.3.2 Efficient utilization of the infrastructure**

According to Sánchez-Díaz et al. (2017) the objective of Off-Peak Hour Deliveries (OPHD) is to reduce congestion generated by delivery vehicles by executing deliveries at other times than morning or afternoon. By delivering outside of the peak hours when the amount of traffic is lower, the time required for delivering is reduced since there are less traffic queues and the loading zones generally are unoccupied, which eliminates double parking and waiting on idle. OPHD is a way of balancing the extensive utilization of the road infrastructure during the day with sub-utilization during the night. The energy required for delivery in terms of fuel will be lower since waiting time in traffic is partially removed due to lower congestion. At the same time the vehicles will be utilized more efficiently from the perspective of the distribution companies, as they are being used more hours of the day. The OPHD may be assisted, i.e. when there is a receiving party being present at other hours than open hours or unassisted, i.e. when the driver is granted access to an unmanned facility on the premises of the receiver.

Sánchez-Díaz et al. (2017), points out some limitations for OPHD such as issues with security, liability, noise and increased costs. The nature of the deliveries at night, with higher crime risk, results in a more dangerous working environment for the drivers. As there is no signature from the receiver when the delivery is done, in the case of unassisted delivery, there is also the liability issue of who is responsible for the goods between drop-off and morning personnel arriving. Noise, especially if the receiver is located at the bottom of residential buildings, is also an issue. However, there are ways to reduce the noise levels with newer delivering practices and equipment adapted for these kinds of deliveries, such as electric vans and silent wheels on load carriers. The extra cost of manning the premises of the receivers is also an issue. When a program was initiated to trial OPHD in New York by the city's municipality, a substantial amount of incentives paid to participants was attributed for compensating receivers for the extra costs linked to staff. Most of the participants with assisted OPHD returned to regular hours deliveries after the trial ended. However, 90% of the participants using unassisted OPHD during the pilot, carried on to use those after the pilot as well.

The centralized receiving stations can be designed in a couple of different ways depending on the type of building and deliveries, according to Jaller et al. (2015). It can be the receptionist signing for all tenants in the building, a loading bay where the goods are delivered to with additional personnel handling the internal logistics or a designated room or area where the goods may be

dropped off without signature. In the last example, the freight drivers may be given access to the building after closing to facilitate unassisted OPHD (Sánchez-Díaz et al., 2017). To mitigate liability and security issues with giving freight drivers access to the building, monitoring can be increased or virtual cages can be installed. A virtual cage is an area in close proximity to the entrance where goods can be left until arrival of morning personnel, without triggering the security alarm (Sánchez-Díaz et al., 2017).

Unfortunately, there are several constraints for a centralized receiving station. LTGs are often located in areas with high land value, meaning that the space is scarce and it might be regarded infeasible to use some of the space in the building for storage (Jaller et al., 2015). Another concern is the liability issues, which arise since the delivery must be signed by an authorized person, which usually requires a representative of the company receiving the goods. A centralized receiving station also requires cooperation between several stakeholders such as property management firms, the tenants and the distribution companies (Jaller et al., 2015). Apart from space, implementation of centralized receiving stations induces an investment for the property owner, while the benefits are obtained by the logistics provider and the receivers of the goods (Behrends, 2019). However, space may be the most crucial barrier to overcome in order to achieve consolidation in LTGs (Jaller et al., 2015).

A common carrier locker system according to Goodchild, Ivanov and Kim (2019) are lockers that logistics providers' business systems are integrated into. Thus they can interact with these and see which lockers are free to make deliveries to and see how long a parcel has been there. By delivering directly to the lockers one of the most time consuming aspects of the job can be eliminated, searching for the recipient. Goodchild et al. (2019) conducted a trial in a 62 story multi-tenant building in Seattle in which it was managed to reduce the time the delivery personnel spent inside the building by 78% and had zero failed first deliveries. Therefore helping with achieving both of the goals for effective Final 50 Feet distribution.

Although common carrier lockers can lead to improvements, there are challenges by implementing such a system. There is the legal question of who is responsible for the goods while it is in the locker, something that has surfaced here in Gothenburg when the triple helix collaboration CLOSER researched these lockers in their projects SESAM 1 & 2 (CLOSER, nd-a; CLOSER, nd-b). Also not all deliveries are suitable for delivery to lockers as they might be too bulky, valuable or perishable (Goodchild et al., 2019). In addition, there is the question of who should pay for the investment. Similarly to the centralized receiving stations the costs and benefits are not distributed equally, with the property owner having the costs while benefits are obtained by distribution companies and the receivers (Behrends, 2019; Goodchild et al., 2019). It is also important to have as many distribution companies in the city as possible on board for the lockers to be effective (CLOSER, nd-b). These lockers can also be combined with OPHD (Behrends, 2019; CLOSER, nd-b).

## 2.4 Large urban freight traffic generators

Businesses are often forgotten in the context of urban freight distribution according to Jaller et al. (2015). The public has a good understanding of the fact that a facility such as a port or railway goods terminal generates a lot of freight traffic. However, these kinds of facilities only represent a small proportion of the freight traffic being generated in the city. Building size is correlated to the amount of freight trips it generates, with large buildings generating a substantial amount of the total amount of freight trips in an urban area. Buildings are being distinguished by the business size which itself is based on the number of employees in the building as well as the area. The problem may be clearly visualized by the fact, introduced earlier, that 56 large buildings in New York, out of more than one million buildings, generate 4% of all the freight trips. These buildings are regarded as large freight traffic generators (LTGs). Thus, LTGs should be regarded as equally large freight traffic generators as ports and container terminals.

LTGs have a significant impact on the activities and by extension the traffic situation on the streets since a large number of vehicles are bound for those locations. Thus, the efficiency of the activities taking place inside the buildings and its adjacent area are crucial. However, many multi-tenant multistory buildings are not optimized for receiving deliveries. As many old buildings are designed for receiving letters and not a bundle of boxes each day, the inner layout of buildings impacts the efficiency of delivery operations (Haag & Hu, 2019). Many businesses as well as consumers deliveries, for instance parcels, require signature upon delivery (Allen et al., 2018). This reduces the delivery efficiency further since a company representative is required for completing a delivery. In some cases, deliveries may be received in the building's reception. However, that is not too common and a significant amount of time is being used for finding and waiting for the right person to sign the delivery. This time also includes trivial things such as waiting for the elevator, which speed and capacity naturally affects delivery time, especially if the driver has to make several deliveries within the building. Further, the delivery is being constrained by the hours of operation, staff availability, desired delivery windows by the customers among others (Allen et al., 2018). This also results in various unnecessary flows within the building in order to complete the delivery which could be eliminated altogether (Allen et al., 2018).

It is also important to note that not only LTGs generate a significant number of freight trips. In addition to large buildings, ordinary households also generate a lot of traffic. In New York, 15% of the households receive a package every day (Haag & Hu, 2019). Retailers being part of national or multinational chains also generate the biggest freight flows in the city in terms of volume (Behrends, 2019). However, these businesses are often sourced by a centralized system consisting of warehouses where consolidation is being made prior to the distribution. Smaller retailers, such as cafes, restaurants and smaller offices generate a significant amount of freight trips since their possibilities for consolidation are limited (Behrends, 2019). In comparison, according to a study conducted in England, a specialized store generated up to 14 trips in a week

while a retail chain store generated only 2 to 4 trips, while an average business generated 9 deliveries (Cherrett, Allen, Mcleod, Maynard, Hickford, & Browne, 2012). Thus, the smaller businesses should not be overlooked.

Another issue apart from the LTGs in the urban freight context is the discrepancy between freight volume and freight trips. In Gothenburg for instance, in the largest shopping mall Nordstan, 10% of the deliveries account for two thirds ( $\frac{2}{3}$ ) of the total volume being received, while the other one third ( $\frac{1}{3}$ ) generates the other 90% (Behrends, 2019). Further, there is concentration to both time and space of the deliveries, where Gothenburg has a certain pattern as many cities do. The city itself generates many deliveries in the central parts due to the existence of many businesses, schools, hospitals, clinics and retailers. The general pattern of city distribution in Gothenburg is starting in the northern part of the city, an area called Bäckebol, located in proximity to a large industrial area called Backa Industriområde, containing many logistics providers' warehouses. Deliveries and distribution in the city center are taking place in the morning while the collection is taking place in the afternoon with goods consolidated and transported back to the terminals where distribution has started from (Göteborg Stad, Trafikverket & Västtrafik, 2017). These factors further illustrate the complexity of the problem.

## **2.5 Gothenburg municipality policies and guidelines**

The local municipality has a significant role and some of the necessary tools in order to make the urban freight transportation sustainable. After all, one of the tasks of the municipality is to provide citizens an attractive place to live, which in the context of Gothenburg is stated in the city transport strategy until the year 2035 (Göteborgs Stad, 2014). However, in many cases, the city planners do not realize the importance of freight transportation, at least in the Swedish context. The municipalities often lack resources, competence and sufficient data in order to be able to control freight transportation on a strategic level (Behrends, 2019). Simultaneously, in Sweden they have significant power in terms of implementing local policies apart from the national legislation. Furthermore, the decisions taken by municipality largely affects many stakeholders while some of the stakeholders are not taking initiatives before the municipality does since the effects of investing in many of the practices is unknown. In the end, it results in a status quo, with stakeholders waiting for the first move by another stakeholder (Dablanc, 2007). In addition, the lack of competence and understanding may result in counter effects not being realized before implementation of such policy. An example of this, is the applied time restriction by Gothenburg municipality on Drottninggatan in the central city, containing many shops. The time restriction bans vehicles from delivering goods after 11 o'clock in the morning until 7 o'clock the next day. "Considering the shops open at 10 o'clock, the delivery window is just one hour long, resulting in more freight traffic generated" (Nilsson, 2020).

According to Behrends (2019), municipalities in Sweden can affect the prerequisites for urban freight transportation in following ways: *traffic guidelines* (trafikföreskrift), *building permit*

(bygglov), *detailed zoning plan* (detaljplan) and *overview plan for land use* (översiktsplan). With the *traffic guidelines* the municipality is able to control the type of vehicles entering certain areas, manage parking spaces for loading and unloading, implement low emissions zones, and encourage consolidation. *Building permits* may be used in order to make loading and unloading operations more efficient by forcing private property owners to comply with certain rules. A *detailed zoning plan* can be used to secure space for loading and unloading activities for a certain building while an *overview plan for land use* could potentially give way for solutions such as urban consolidation terminals in the city center.

The city's *construction board* (Byggnadsnämnden) is the entity deciding on feasible solutions for mobility and parking in the detailed zoning plans, which in terms is the document deciding what buildings in an area will look like and how the land will be utilized (Boverket, n.d). Other concerned parties have a chance to make their statement when a suggested detailed zoning plan is being presented. The city planning department and the traffic department within the municipality, in the case of Gothenburg, are the ones producing suggestions for project specific solutions for mobility and parking in consultation with other departments and the concerned construction company during the detailed planning. Further, in cases when a building permit is being applied for, based on a detailed zoning plan approved before 2018, when the new guidelines for parking and mobility were conducted or in cases where new solutions for mobility and parking are required, the construction company may initiate an investigation and make an agreement with the municipality regarding the mobility actions (Göteborgs Stad, 2018). The new guidelines for parking and mobility were applied in 2018, replacing the previous guidelines from late 2011, resulting in a requirement for revision of parking and mobility issues at premises.

When examining actual laws on the matter, the following law and paragraphs are of importance. The Swedish national law of planning and construction (Plan- och bygglagen) specifies some requirements in terms of parking, loading and unloading. Chapter 8, 9th paragraph of the planning and construction law states that a plot on which a building construction is taking place, shall be organized in such a way that sufficient amount of space for parking, loading and unloading of vehicles is provided. This is also applied for plots already containing buildings to a reasonable extent. Both private cars and bicycles are regarded as vehicles by this law. The law further states (Chapter 4, 13th paragraph) that municipalities may regulate the placement and design of parking spaces for vehicles, through the detailed zoning plan. The municipality may also regulate that certain land or certain buildings may not be used for parking (Göteborg Stad, 2018).

The responsibility for providing parking spaces lies primarily on the property owner. Before the municipality grants a building permit, it is required to ensure that the requirements for parking are being met (Göteborgs stad, 2018). If the property owner or another party applying for the building permit is unable to meet the requirement for parking within the plot, the party is

required to provide parking in another space, although close to the plot. Further, it is specified that a docking space for loading and unloading, as well as parking spaces for people with disabilities shall be placed in proximity to the building's entrance. In some cases, the investigation regarding mobility for when the area has obtained a new detailed zoning plan, mentioned earlier, is not required. When a new building is being constructed in a plot already containing buildings, a simpler procedure is adopted which results in the building receiving no additional parking spaces. However, it is required to provide sufficient space for bicycle parking. The most important piece of the guidelines in scope of this thesis is the following. *The basic requirements for accessibility for persons with impaired mobility or orientation as well as possibilities for loading and unloading shall always be provided* (Göteborgs Stad, 2018).

When examining Gothenburg municipality guidelines for parking and mobility, it is stated that the ambition of implementing those is to develop a sustainable city while balancing the social, economic and environmental aspect. The aim is to make Gothenburg an attractive place to live both now and in the future with an accessible city center while giving way for pedestrians, cyclists and public transport, as mentioned previously (Göteborgs Stad, 2018). The infrastructure of the city will be used efficiently while minimizing the negative externalities such as transportation's effect on the environment. An additional sense of urgency is provided by the fact that the city is expected to become more densely populated with better exploited space than currently which is why innovative mobility solutions are required in order to reduce car ownership and use in the city in favor of walking, cycling and using public transport.

The laws described above together with guidelines are mostly focused on parking. Logistics activities in terms of loading and unloading are mentioned, but are not clearly specified. Behrends (2019) states that the requirements for logistics activities should be described as detailed as the parking matter. Freight transportation could be included in the detailed zoning plan and building permits while municipalities could implement guidelines for assessing anticipated space required for logistics activities in terms of infrastructure as well as feasible solutions which would reduce the freight traffic and the number of deliveries.

A way to induce cooperation between the stakeholders are Freight Quality Partnerships (FQPs). Municipality does indeed have quite a lot of responsibility and in order for its actions to be aligned with what is actually required, a dialogue is needed. FQPs provide a framework of local authorities for including stakeholders in discussions of freight transport in urban areas (Lindholm, 2014). These partnerships can potentially induce better understanding for each other's agenda and result in more efficient freight operations. It is also a way of perhaps breaking up the status quo in the urban freight context with stakeholders waiting for each other to take action, as stated by Dablanc (2007). They may be challenging to implement as the private and public sector have different goals and problems. The participants will require reasons for participating in such partnerships but the possibility of sharing their prerequisites with other

stakeholders is what might offset those difficulties. It has also been concluded that these partnerships increase cooperation between private and public actors (Lindholm, 2014).

## 2.6 Freight plans

In this section, the freight plans of London and Gothenburg will be presented. These act as strategies where the municipalities are expressing their view on how freight is conducted in the city accompanied by planned measures in order to make them more sustainable. They are publicly available and may be viewed as an illustration of what local governments are doing or plan to do with their tools for action such as building permits, traffic bans, zoning and others. The reason why London is being chosen as a counterpart to Gothenburg, is due to London having other specific plans and studies which have been conducted by its local government body Transport for London (TfL), apart from a general freight plan. For instance, a study regarding deliveries to offices has been conducted by the same entity which is prevailing for this thesis.

### 2.6.1 London

Transport for London has produced additional freight plans since 2006, as an extension from documents regarding an overall transport strategy in the city. As the mayor states in the latest edition of *freight and servicing action plan*, most of the citizens think of their day to day commuting patterns when they think of transport (Transport for London, 2019a). Freight transportation constitutes major importance in order for the city to work, although not being recognized by the general public. As 90% of the deliveries in London are carried out by road, the impact of growing e-commerce is becoming clearer. It drives forward increasingly divided deliveries, which is a characteristic of parcel deliveries (Behrends, 2019). It further drives the congestion, which has cost London 9,5 million dollars in 2017, as more and more delivery vehicles are being assigned by 3PL companies due to increasing volumes (Transport for London, 2019a). The movement of goods in London has grown by 20% since 2010, contributing to worsening congestion and local environment (Transport for London, 2019b). Many of the citizens and businesses are not aware of how their purchasing behavior affects the traffic situation and to what extent they generate negative externalities. The *freight and servicing action plan* provides measures to encourage citizens and businesses in London to consider this impact and choose better delivery options (Transport for London, 2019a). By tackling these issues, the local business and the local environment may be benefited as the number of vehicles on the road will be reduced. The overall goal of the freight and servicing plan is to ensure that deliveries and pickups of goods can be made as the number of citizens in London as well as the number of freight trips will continue to grow (Transport for London, 2019a).

In a number of measures, TfL strives to affect customer demand in order to minimize vehicle movements. The governmental body chooses to tackle the source of the problem, the behavior of the consumers which generates vehicle movements. London is a city where vans (freight vehicles



under 3,5t) have a substantial market share in freight transportation, which has likely been driven by on-demand deliveries (Transport for London, 2019a). Since these vehicles have small freight capacity and low energy efficiency compared to trucks, efforts of TfL are focused on making consumers choose click and collect options for their deliveries of parcel goods for instance. In addition, TfL strives to work with businesses and other stakeholders in order to encourage projects such as green delivery slots, where a consumer may choose a delivery in the same slot as other deliveries in the nearby area will be made. TfL also plans to provide businesses with land in the city center for micro-consolidation centers. Consolidation gives way for utilization of other transport modes, as well as better load factor of the vehicles (Behrends, 2019). The plans of TfL also include working with businesses in order to alter their delivery patterns to off-peak hours while also cooperating with their neighbors.

TfL clearly recognizes the importance of multi-tenant premises due to them being large consumers of various services and deliveries. Those premises have significant power to affect the number of delivery trips in London as a whole. After having a dialogue with TfL representatives, many of the tenants have introduced or supported practices for reducing the number of service trips and deliveries (Transport for London, 2019a). The driving forces for businesses to consider the effects of their deliveries are cost reduction opportunities as the delivery trips are becoming fewer, improving their internal operations as well as contributing to a better local environment adjacent to their premises. TfL further plans to use the best practices from property managing firms that they are collaborating with and implement those elsewhere in the city. Further, TfL provides businesses with *delivery toolkits* consisting of guidelines regarding consolidation of waste, rescheduling deliveries and reduction of personal deliveries to a business (Transport for London, 2019c).

The latter, partly focuses on the deliveries to individuals as the average rate of 40% of all deliveries to offices in central London are personal deliveries to workplaces (Transport for London, 2019d). In comparison, the number was 20% in 2015 while 97% of the offices allowed for personal deliveries at the workplace (Transport for London, 2015). It is important to note that TfL highlighted the problem of office deliveries as early as in 2015. At the time, it was already recognized that by educating businesses regarding OPHD and consolidation of goods, it could reduce congestion on the city's roads. One of the key findings of that study was that a substantial amount of goods, 49%, was already delivered in consolidation. The number was even higher for larger buildings, 60%. It appeared that consolidation was primarily initiated by the logistics providers, further highlighting the potential of increasing understanding of the problem by the receiving businesses. The potential is illustrated further when considering that 47% of the offices shared their buildings with other businesses. (Transport for London, 2015). In the latest freight and servicing plan, TfL states that one of its actions regarding reducing the number of vans entering the city will be by discouraging personal deliveries at work (Transport for London, 2019a). In order to support that, the document *Reducing personal deliveries to your workplace*

was conducted for the businesses in the city (Transport for London, 2019d). Finally, TfL aims to work with boroughs (local governments across the city) in order to improve planning for multi-tenant buildings as well as establish micro-consolidations centers in new buildings (Transport for London 2019a).

### **2.6.2 Gothenburg**

The city of Gothenburg has attained a more general approach, conducting a transport strategy for the city, instead of highlighting any special importance of freight transportation, at least not in a separate study. The motivation for conducting a transport strategy is Gothenburg's ambition of growing substantially and developing its logistics importance for Sweden and Scandinavia while simultaneously not jeopardizing the local environment for the inhabitants. The vision is, as mentioned previously, to encourage walking, cycling and give way to public transport by discouraging the usage of private cars (Göteborgs Stad, 2014). As presented in the problem discussion above, the transport strategy consists of three goals: *making Gothenburg an accessible regional center, creating an attractive urban space and a vibrant urban life and making Gothenburg the logistics center of Scandinavia*. Transport strategy document states that these have been formulated, based on the *Comprehensive plan for Gothenburg* illustrating the major challenges for Gothenburg in the future. The Comprehensive plan was conducted as early as 2009, discussing freight only in the context of goods being accessible for consumers as well as the importance of handling the increasing freight traffic linked to the port of Gothenburg (Gothenburg City Planning Authority, 2009).

Consequently, being based on the Comprehensive plan, the transport strategy focuses on three main goals: *travel, urban space and transport of goods* in a rather broad manner, with transport of goods being focused on logistics facilities around the city as a way of strengthening Gothenburg's position as a logistics hub. Goods movement in the context of the city are discussed as a goods transport strategy with the main objective being by “*working in collaboration with other bodies to make Gothenburg a world leader in efficient, climate-smart handling of goods* (Göteborgs Stad, 2014). For that the city will work with:

- Ensuring good accessibility for transport in Gothenburg while simultaneously reducing negative local environmental effects.
- Collaborating regionally in the establishment of logistics centers and transport-intensive operations.
- Stimulating innovation in collaboration with academic institutions and businesses.

Travel paradigm, according to which the city of Gothenburg desires to be more sustainable, is partially aimed at eliminating unnecessary trips for individuals. This has to be done in order to reduce car usage in the city. The journeys which have to be made, should be done by public transport or other more environmentally efficient modes. In order for less travel to be possible,

the citizens need access to various services in their proximity, such as shopping. Thus more supply is required closer to the citizen. However, it is not discussed how this will affect the freight travel patterns (Göteborgs Stad, 2014).

Optimizing goods distribution is discussed in the freight plan in the context of urban space strategy. In terms of trade and retail areas, it is stated that most of the deliveries are being executed by vehicles weighing over 3,5 tons. The areas are varying in configuration which is why each of them requires adaptation to a particular area (Göteborgs Stad, 2014). According to the transport strategy (2014), goods accessibility is achieved by efficient infrastructure, policy instruments and new transport systems, solutions for which are more walking areas, local traffic regulations and time windows for goods distribution, as compared with the case of Drottninggatan and the general time ban for freight in the city mentioned earlier. Later, the emphasis is made on using cleaner vehicles as the project Stadsleveransen is being mentioned. Stadsleveransen is a project consisting of consolidating goods from various logistics providers, at a central warehouse location in order to execute deliveries in small electric vehicles in a predefined area in the central part of Gothenburg. The strategy does not contain a more specific approach on how the deliveries are being made and what kind of obstacles there are. However, the municipality acknowledges the fact that in order to stimulate innovation for Gothenburg to be at the leading edge of logistics, collaboration with businesses is required (Göteborgs Stad, 2014).

## **2.7 MAMCA**

Multi-Actor, Multi-Criteria Analysis (MAMCA) is an analysis method which includes the affected stakeholders for a project early on in the process and incorporates the objectives of these stakeholders (Macharis, De Witte & Ampe, 2009). This is one of the differences between MAMCA and similar methods such as Multi-Criteria Decision Analysis (MCDA) which MAMCA is an extension of. MAMCA can also include both quantitative and qualitative criteria and let the stakeholders assign a relative importance to their different criteria which makes it a comprehensive evaluation process. The inclusion of different types of criteria that cannot be assigned a monetary value is advantageous in transportation projects as objectives such as a life saved can be difficult to assign a monetary value to.

Transport projects and the respective solutions are complicated and affect several stakeholders with diverging needs and preferences (Macharis et al., 2009). A stakeholder is “any individual or group of individuals that can influence or are influenced by the achievement of the organization’s objectives” (Freeman & McVea, 2001). As stakeholders are involved in the decision process early on in MAMCA, it is a suitable method for evaluating transport projects (Macharis et al., 2009). The success of these projects is dependent on wide acceptance from different stakeholders (Macharis et al., 2009). In recent years the focus has shifted from purely looking at economic effects in evaluating solutions regarding transport. Nowadays the spatial,

the ecological and the social aspects are also included in order to ensure that a more sustainable solution is found (Macharis et al., 2009).

MAMCA provides a graphical comparison that shows which stakeholder that supports which alternative(s) based on which criteria they assign most importance to (Macharis, Turcksin & Lebeau, 2012). The evaluation of the solutions is done by Analytical Hierarchy Process (AHP) where each alternative is set against all the other alternatives in a pairwise comparison. MAMCA provides the stakeholders with valuable information about what criteria other stakeholders have, how they assign the weight between these criteria and how different solutions are viewed by them. The alternative that scores the highest is thus not always the best decision, instead the insights gained during the analysis should be used to create policies that have broad acceptance.

The seven steps when performing a MAMCA are as follows:

- *Step 1: Define problems and alternatives*
- *Step 2: Stakeholder analysis*
- *Step 3: Define criteria and weights*
- *Step 4: Criteria, indicators and measurement methods*
- *Step 5: Overall analysis and ranking*
- *Step 6: Results*
- *Step 7: Implementation*

Steps 1-3 are performed interactively and in a circular way to ensure that as many relevant aspects as possible are included in the analysis, which mainly is done in the first four steps (Macharis et al., 2009). In step five an evaluation matrix is constructed and in the sixth step a ranking of the alternatives is presented together with the strength and weaknesses of them. Step seven is the actual implementation of policy.

## **2.8 Literature critique**

Firstly, the theoretical framework outlines city logistics followed by urban goods logistics as subjects which the thesis is based upon, followed by last mile delivery and the Final 50 Feet of logistics. As the thesis aims at answering two questions regarding the Final 50 Feet of urban goods distribution, the presence of the other logistics definitions may seem unnecessary. However, there are several reasons for including the others. The concept of the Final 50 Feet of urban goods distribution is part of the last mile delivery operations. The decisions regarding city logistics, functioning as an umbrella for the other levels of logistics activities in the city are taken higher up in the hierarchy. Thus, Final 50 Feet of urban goods distribution cannot be discussed without explaining the connection of it to the other logistics activities, although the other logistics concepts are not being used as frequently further in the empirical material and the analysis. In order to be able to involve the important stakeholders having an effect on the Final

50 Feet issue, the scope had to be widened for the sake of the thorough discussion of the problems and potential solutions for the Final 50 Feet issue in Gothenburg.

The theoretical framework also includes various laws linked to requirements set on the buildings in Gothenburg regarding parking and loading and unloading facilities. The goal of presenting those is to familiarize the reader with the amount of requirements set on the buildings and to examine whether it could potentially generate issues for the Final 50 Feet in terms of the rules not being tough enough or being too strict. As the permit acquisition stage in planning of a building is not as thoroughly discussed later in the thesis, the presence of the requirements may seem questionable. The feasibility of the requirements was however discussed with the stakeholder representatives participating in the thesis in order to be able to position those as either an obstacle or facilitator for the Final 50 Feet issue in regard to multi-tenant multistory buildings in Gothenburg.

In addition to the requirements in the form of laws, a transport strategy for Gothenburg was compared to the freight plan of London. The choice of a comparison to only one city might be regarded as vague. However, freight plans have been conducted in a very limited number of cities around the globe while London being one of the pioneers, especially regarding the recognition of the problems of deliveries linked to office buildings. This was later verified by the discussion with stakeholder representatives, often referring to London as a city where a lot has been done already regarding problems linked to last mile and the Final 50 Feet due to emergence of the delivery related problems in the city. Including other cities with a comprehensive freight plan would have been beneficial, although also potentially time consuming, jeopardizing the research of other aspects included in the thesis due to a predefined deadline for the completion of this research.

## **3.Methodology**

*The methodology of this master thesis will be presented in the following chapter. Firstly, the process of literature review will be discussed, followed by other data gathering. Secondly, the feasibility and credibility of the study will be reviewed. Lastly, the analysis method, described in the theory section will be explained from the methodology point of view. The following methodology was constructed by consulting suggestions provided by Collis and Hussey (2014, p.308) summarizing necessary sections of a methodology chapter for an interpretivist study.*

### **3.1 Literature review**

In this section, the process of literature review as well as examination of relevant documents will be described.

#### **3.1.1 Literature**

The process of gathering theory as a basis for this thesis was initiated by examining existing literature on the matter, which we regarded as the secondary data for the thesis. As the subject, *the Final 50 Feet of urban goods distribution*, chosen for this thesis proved to be very narrow, the amount of literature linked to the concept was limited at the time of writing. The Final 50 Feet of urban goods distribution as a concept was first defined and published in an academic article as late as two years prior to initiation of this thesis (Goodchild & Ivanov, 2017).

Therefore, the theoretical framework was complemented by more general theory on the subject of city logistics. The concept of Final 50 Feet cannot be discussed without using it in a wider context of last mile deliveries and its impact on urban freight transportation in a comprehensible way for a reader unfamiliar with city logistics. In addition, the solutions that are discussed in the literature regarding both city logistics and Final 50 Feet cannot be isolated. Many of them are interdependent and have to be explained from various standpoints in order to illustrate how these affect each other. This being said, the research is focused at predominately exploring the Final 50 Feet related problems. Last mile deliveries are discussed together with the Final 50 Feet as they both are parts of various supply chains where actions in one part of the chain usually have an effect in other parts. Problems related to the Final 50 Feet involve several actors and other dimensions which is why a broader discussion is required although not being the aim of this thesis.

The base of the literature for this thesis was collected by initially searching for scientific articles in databases such as ResearchGate, Google Scholar and Science Direct. During the search, keywords were used in order to find the most relevant articles. The keywords used during the search were the following: *city logistics, urban freight, last mile delivery, logistics in buildings, vertical movement, horizontal movement, Final 50 Feet, MAMCA, distribution, collection, tenants, receivers, large trip generators*. Later, cross references in the most relevant scientific

articles were examined. This was partially done in order to expand the literature base with relevant issues which have not been realized previously as well as in order to group authors reoccurring in various literature in the subjects of last mile delivery and Final 50 Feet. The scientific articles used in this thesis have been subjected to a quality control method of peer review, which is indicated by the search engine of Gothenburg University Library. Other publications, such as municipality guidelines and strategies were obtained via official websites.

### **3.1.2 Official documents**

The theoretical framework was expanded by including various case studies on the subject of last mile delivery and the few studies which have been conducted on the Final 50 feet of urban goods distribution in the context of vertical and horizontal movement in the buildings. As the problems related to city logistics are complex in the sense of involving various actors with heterogeneous needs, as stated earlier by Cardenas et al. (2017), various points of view had to be included in the theoretical framework. The stakeholders were chosen after consulting a number of explanatory articles on the subject, such as Cardenas et al. (2017) and Goodchild & Ivanov (2017). Various documents and guidelines conducted by the stakeholder municipality were included in the theory in order to illustrate how solutions related to last mile delivery and the Final 50 Feet of urban goods distribution provided by the literature can be induced by the municipality. This was also done due to the fact that although the role of local government authorities is recognized in the literature, the regulations and tools used by the municipality differ depending on the geographic context. Thus, the specific regulation and guidelines provided by Gothenburg municipality had to be included in order to discuss the issue from the point of view of that stakeholder, in the context of Gothenburg. The same was done in regard to the strategies conducted by Gothenburg municipality in order to examine the role of freight in the strategies and plans outlined for the city by its municipality.

While secondary data in the form of research articles were gathered using traditional databases, also being used by researchers, official documents had to be retrieved using other methods. Official documents and guidelines are rather easily obtained but are often published not as systematically as research papers. Thus, it is difficult to determine their quality as they are not being peer reviewed in the same sense. In addition, being applied to a certain geographical context, the issues discussed in those might not be directly transferable. Transferability may not be regarded in this case since the research is based on Gothenburg and the London publications are used solely for comparison. However, the quality of these documents is somewhat determined by the fact that they are in most cases based on existing research from the academic world and are still being subjected to various forms of revision since they are being published both for citizens and many different stakeholders to use. Therefore, researchers believe that the quality of these kinds of publications is being established by revision prior to publications but also by the fact that anyone may contact these organizations, such as the municipality in order to highlight various mistakes and uncertainties.

## 3.2 Empirical material

In this section, firstly, the research type used in conduction of this thesis will be discussed, followed by a presentation of data gathering techniques, followed by a description of the research objects.

### 3.2.1 Research paradigm

Research can be classified according to its *purpose, process, logic* and *the outcome* (Collis & Hussey, 2014 p.3). As stated in chapter Research question, the purpose of this research is to study which problems exist in the context of the city of Gothenburg in regard to the Final 50 Feet and last mile deliveries. This was done by involving several stakeholders adjacent to city logistics and consequently the last activities of this delivery process. Consequently, as the study will include several stakeholders, expressing their views in order to combine a complete picture of the issue, the research is *exploratory*. Exploratory research is conducted into research issues which has few or none studies and the aim of this kind of research is to look for patterns and ideas as well as develop a hypothesis rather than to test one (Collis & Hussey, 2014 p.4). Empirical material for this kind of research consists of observations, case studies and experience. The focus of the research is to gain insights and familiarity of the subject (Collis & Hussey, 2014 p.4). Since the conceptual and theoretical structure of this study was developed beforehand in order to be tested by empirical material, this research is deductive (Collis & Hussey, 2014 p.7). However, it may also be viewed as inductive, due to using observations and interviews, the research is moving from observations to statements, or from specific to general. It may also be viewed as an iterative process when one moves from using certain theory in an exploratory manner, in order to make observations and later statements and further develop new theory.

Due to the exploratory character, this research could be regarded to be defined by interpretivism paradigm, since it focuses on exploring a social phenomenon with a view of gaining an interpretive understanding (Collis & Hussey, 2014 p.45). Interpretivism is associated with qualitative methods of analysis, based on interpretation of qualitative research data. Arguably, the study could be regarded as having a positivism paradigm, since the research process started with theoretical material gathered in advance. However, since the study is highly qualitative in the sense of the type of the empirical material and due to the fact that the perception on the matter by the researchers is subjective, although including both paradigms, the study is more inclined under an interpretivist paradigm. When discussing whether a research is deductive or inductive as well as whether it is based on a positivism or interpretivism paradigm, researchers rarely use absolute terms and choose one of these. The view of the researchers of this thesis is that most of the research is done by a mix of paradigm and research characteristics, which is why a consideration and discussion regarding the two is more enriching for the research rather than making a firm statement.



### 3.2.2 Interviews

In order to gain insight and familiarity of the subject, interviews were chosen as the appropriate method for collecting empirical material. Since this research may be regarded as being of exploratory character, interviews are a feasible way to collect primary data since it may be used to find out what the participants do, how they think and how they feel (Collis & Hussey, 2014 p.133). Qualitative research, which is linked to interviews as a data collection method (Collis & Hussey, 2014 p.45) is also a common way of conducting research in the field of city logistics due to the difficulty of examining the operational aspects together with policy making process simultaneously (Cardenas et al., 2017). The traditional approach of face-to-face interviews at the workplace of the participants were chosen. This method provides advantage since comprehensive data can be collected as well as the opportunity of asking complex and sensitive questions is prevalent (Collis & Hussey, 2014 p.134). Face-to-face interviews were conducted by two interviewers in order to ensure that subtle points, nuances and gestures made by the interviewee would not go by unnoticed, as suggested by Collis and Hussey (2014 p.135). In addition, pictures of relevant infrastructure were taken by the researchers as another form of primary data.

The interviews were both used as a part of the MAMCA-process, in order to find the most relevant criteria for each stakeholder, but also in an exploratory matter. A group of actors were chosen in regard to stakeholders involved in the problems described by literature as mentioned above. Interviews and a MAMCA was chosen according to the typology provided by Cardenas et al. (2017), where surveys and multi-actors analysis is stated as a relevant type of research in city logistics context. The interviews were partly conducted in regard to the MAMCA-process. In the first part of the interviews, the participants were subjected to a structured interview process in order for them to outline important criteria from their point of view, in the context of being a stakeholder in the city logistics of Gothenburg. After completing the structured interviews, the second part of the interview was semi-structured which consisted of a number of open questions, prepared in advance. These were prepared in order to encourage the interview objects to talk (Collis & Hussey, 2014 p.134). The questions were not asked in a specific order since the interview objects provided information when discussing something else in regard to the issue of last mile delivery or Final 50 Feet of urban goods distribution.

A number of interviews, which were planned to be conducted face-to-face had to be converted to telephone and online interviews. This was done due to rapid development in regard to the spread of COVID-19 in Sweden and Europe from late February 2020 and onwards. Several companies and organizations being part of this thesis, quickly changed their policies and forbade physical meetings and visitors at their facilities. People in the society as a whole were encouraged to work from home, the university at which this thesis was conducted not being an exception. Telephone interviews naturally provide various forms of limitations when being compared to interviews face-to-face. One limitation being the fact that telephone interviews tend to be shorter than physical meetings, since it is harder to keep the conversation active (Collis & Hussey, p.134).

This development was expected to affect the quality of the interviews somewhat, however it was still perceived to be sufficient enough for the empirical base of the study. Due to inability to postpone the research process for an unknown period of time, being a master thesis with a predefined deadline, these adjustments had to be made. In addition, a number of interviews were synchronous mediated interviews, in the form of a webcam conversation (Tracy, Sarah J, 2012, p.163).

The answers provided in the first part of the interviews linked to MAMCA were later analyzed using software in order to illustrate important objectives for each stakeholder involved and how these correlate between the stakeholders. Thus, the empirical material provided in the first part of the interviews was analyzed by a predefined analysis method, while the second was analyzed in regard to the existing literature on the issue. The interviews were recorded with permission of the interview objects and later transcribed. A choice of remaining anonymous was given to the interviewees as well as an offer of the opportunity for the company to remain anonymous.

In consultation with the representatives of the stakeholder logistics providers, observations were chosen as an additional method for data gathering. As the research includes exploring issues regarding vertical and horizontal movement of goods, participant observations were chosen. In these kinds of observations, the researcher is fully involved with the participants in order to understand the values, motives and practices of those being involved (Collis & Hussey, 2014 p.148). It is also a common way of acquiring qualitative data under interpretivist paradigm. Practical observation in regard to this thesis were conducted by researchers following the delivery drivers of two logistics providers in order to get an insight on operational problems hindering their work and visually acknowledging the operational inefficiencies when delivering inside multi-tenant buildings. During these observations, the delivery drivers were also subjected to semi-structured interviews. Observations were regarded as beneficial for the thesis since drivers are rarely included in research related to city logistics although arguably being the best source for knowledge regarding nuances and challenges of delivery operations.

### **3.2.3 Interview sample**

When selecting a sample under the interpretivist paradigm, the data acquired by research is not being used statistically in order to generalize from the sample to the population (Collis & Hussey, 2014 p.131). Therefore, it is not required to choose a random sample. One could argue that since MAMCA is being included in the analysis, which is partly based on numerical values for ranking objectives, that this part of data gathering is quantitative. However, the ranking will be provided in the structured part of the interviews, in order to gain a view on issues within an industry in a particular context. Thus, these results cannot be generalized. Since it is impossible to include every single participating party, under each stakeholder paradigm, the scope of the study was narrowed to a geographical context as well as a number of representatives of each stakeholder. Snowball sampling and networking was used as a method for choosing interview

objects as the research required people with experience in the phenomenon of last mile delivery and Final 50 Feet of urban goods distribution (Collis & Hussey, 2014 p.132).

Initially the interviewees were chosen, as stated previously, based on the types of stakeholders discussed in literature by Goodchild and Ivanov (2017). When the following types of stakeholders have been decided upon: *logistics providers, municipality, property owners and tenants*, particular representatives were contacted. The logistics providers were found by networking within academia (Logistics Department at School of Business, Economics and Law at Gothenburg University) having contact with these kinds of businesses, as well as personal contacts of the researchers. Two logistics providers, delivering parcels as well as other goods were chosen after consultation with the supervisor of this thesis. The providers chosen are branches of some of the biggest logistics providers in Sweden. The contact with the Gothenburg municipality and its Traffic Department was established by snowball sampling, by using the network of the researchers in order to reach appropriate representatives. Property owners were chosen based on their participation within an FQP of Gothenburg, *Godsnätverket*. It consists of various stakeholders such as politicians, logistics providers, property owners, academia professors and others. The receivers were chosen based on them having offices in large multi-tenant multistory buildings in central Gothenburg. In addition, the developers of the MAMCA tool were contacted for consultations. The FQP of Gothenburg has also been involved when searching for other potential participants of this thesis, via a list of participants of the network presented to the researchers. These participants were regarded as feasible interview objects due to their knowledge and broader understanding of the freight related issues in Gothenburg, partially due to their participation in the network. Below in table 1 is a summary of the field observations of the drivers and a summary of the interview participants in table 2:

<b>Date</b>	<b>Participant</b>	<b>Company Type</b>	<b>Position</b>	<b>Time</b>
3/3	Driver 1 Company A	Logistics Provider	Delivery driver	6 hours
3/3	Driver 2 Company A	Logistics Provider	Delivery driver	7 hours
11/3	Driver 1 PostNord	Logistics Provider	Delivery driver	6 hours
11/3	Driver 2 PostNord	Logistics Provider	Delivery driver	6 hours

Table 1. *Field observations*

<b>Date</b>	<b>Company / Organisation</b>	<b>Type</b>	<b>Position of the interviewee</b>	<b>Time</b>	<b>Approach</b>
17/3	Distribution Company A	Logistics Provider	<b>Operations Manager</b>	45	Telephone
18/3	PostNord	Logistics Provider	<b>Chief of production</b> at a PostNord distribution terminal	45	Telephone
13/3	Traffic Board at Gothenburg Municipality	Municipal board	<b>Freight Traffic Manager</b>	90	Face to face
7/4	Castellum	Property owner	<b>Hans Sahlin</b> - Chief of Logistics	40	Telephone
31/3	Vasakronan	Property owner	<b>Sarah Blomqvist</b> - Property manager	60	Online
31/3	Vasakronan	Property owner	<b>Jesper Örtengren</b> - Business developer, logistics manager	60	Online
14/4	Receiver Company A	Receiver (Business)	<b>Front Desk</b>	20	E-mail
20/4	The West Sweden Chamber of Commerce	Receiver (Business)	<b>Magnus Svensson</b> - IT, Office service	20	Telephone

Table 2. *The participants of the interviews*

### **Distribution Company A**

Distribution Company A, chosen to remain anonymous, is a logistics provider, daily delivering close to a thousand parcels across the central parts of Gothenburg, as well as offering other services. Around a dozen vans below 3,5t in total weight service the center of the city, delivering parcels to various businesses and organizations. The company offers capacity in its transport units, i.e. it is a truck service offered for a specific leg of a transportation chain. Private residents are not covered by this service. The operations manager of the distribution was interviewed representing the stakeholder logistics provider. The interviewee regularly participates in the FQP of Gothenburg, Gods nätverket. Apart from the operations manager, two other company representatives, delivery drivers were interviewed as well, during observations out in the field made by the researchers of this thesis, predominantly servicing the central areas of Gothenburg. The servicing locations were crucial as these areas contain the most inefficient buildings from logistics point of view according to the initial research.

## **PostNord**

PostNord is a state owned logistics provider which was created by the fusion of Swedish and Danish postal services in 2009 (Regeringen, n.d). It is the largest company in Scandinavia within communication and logistics services. PostNord offers a logistics solution from the collection of the parcel all the way to the receiving end. In the scope of this thesis, its distribution terminals servicing central parts of Gothenburg and all of the island Hisingen (one of the largest areas of Gothenburg) were chosen. The chief of production at the distribution terminal was chosen as another representative of the logistics provider stakeholder. Two drivers, as in the case with the Distribution Company A, were observed and interviewed. The drivers of PostNord included in this thesis also operated in the central parts of Gothenburg.

## **Municipality**

The Traffic Board of Gothenburg Municipality has a wide scope of areas of responsibility. Its main task is to offer mobility in a sustainable way and a city desired by people to work, live and meet in. One of the two Freight Traffic Managers was interviewed in the scope of the research.

## **Vasakronan**

The largest property owner in Sweden, with 174 office and retail facilities across four cities: Gothenburg, Stockholm, Uppsala and Malmö (Vasakronan, n.d.). In Gothenburg, the company owns 35 facilities with a focus at the central areas of Gothenburg. The company owns, manages and develops the facilities. Vasakronan has an outspoken ambition of being a responsible actor, managing its operations in a sustainable way. One of the company's property managers, responsible for five office facilities in the central Gothenburg was interviewed along with the business developer in the retail section of Vasakronan across all of the locations, in addition working with logistics. Another representative, answering a couple of specific questions, forwarded in email format, by the property manager mentioned earlier, was involved as well. The title of the representative is property developer.

## **Castellum**

One of the other largest property owners in Sweden with various types of facilities around Gothenburg, and around twenty other cities in Sweden. The company is decentralized, aiming at strong local presence with a good understanding of various local contexts (Castellum, n.d.). The company's chief of logistics, from the Castellums headquarters was interviewed in the scope of this research. The headquarters are located in Gothenburg.

## **Receiver Company A**

Receiver Company A is a local affiliate of multinational professional services located in the central part of Gothenburg. A representative capable of answering the interview questions was reached via snowball sampling. The questions were answered in an asynchronous way via email.

## **The West Sweden Chamber of Commerce**

The West Sweden Chamber of Commerce (Västsvenska Handelskammaren) is a private organization aiming at facilitating business in the region of Western Sweden. An IT and office service representative was interviewed via telephone. The representative provided answers for the MAMCA part of the interview, regarding criteria and solution weights via email. The reason for participation of this particular individual is the person being the contact responsible for the deliveries arriving to the organization's office. The company operates in a nine story multi-tenant office building in the central of Gothenburg.

### **3.3 Credibility**

In the section, the commonly used concepts for verifying a research will be discussed. Firstly, the research reliability of this thesis will be discussed, followed by validity, generalization and transferability as well as ethical dilemmas.

#### **3.3.1 Reliability**

In order for a research to be reliable, a repeat study should produce the same result (Collis & Hussey p.52). However, under interpretivist paradigm, the replication of the study is of less importance. It is not required that by studying the same sample group, the same results will be obtained. The emphasis under interpretivist paradigm is made on whether the observations and interpretations made on different occasions and/or by different observers can be explained and understood (Collis & Hussey, 2014 p.53). Since the research, under interpretivist paradigm is highly influenced by the researcher, replication would be difficult to achieve. Instead, establishing protocols and procedures that would secure the authenticity of the findings is of bigger importance for these kinds of studies (Collis & Hussey, 2014 p.53).

The goal of achieving reliability in the frame of this thesis is secured by thoroughly explaining the process of the predefined analysis - MAMCA. Although, by repeating the process of using MAMCA in the context of city logistics in other cases would not provide the same result, it would be possible to replicate the seven step process which MAMCA consists of. In addition, thorough explanation of the data gathering process of both primary and secondary data will give the reader an insight on the process of the development of this thesis. Thus, it becomes possible to evaluate whether for instance the participation of an additional stakeholder would be beneficial or the presence of additional questions. As the questionnaire used in the interviews is included in this thesis, the replication becomes somewhat possible but most importantly, the process becomes transparent for the reader. Thus, the requirement of including protocols and explaining the executed procedures is arguably satisfied.

### **3.3.2 Validity**

Validity is referred to whether what a researcher tries to measure, can be measured with the test used by the researcher as well as whether the results reflect the phenomena under study (Collis & Hussey, 2014 p.53). Whether an appropriate test method is used is referred to as face validity. Construct validity is another problem related to validity, referring to the fact that there are some phenomena which cannot be observed. These could be underlying factors which could explain a certain behavior of the interviewee or other study objects such as their motivation (Collis & Hussey, 2014 p.53). These types of underlying reasons for a certain action are known as hypothetical constructs. If such constructs exist, the researcher must be able to explain how the observations and research findings relate to them. As stated by an example by Collis & Hussey (2014, p.53), it is not certain that an employee achieves a high level of productivity since he or she loves their work, but more likely due to the anxiety of job security in a period of economic downfall. The belief that it is the love of working with a particular task that motivates the employee while failing to realize that it might be anxiety that motivates the employee instead is a common pitfall.

Although responses to the questions given by the researcher may be reliable, the result may still be invalid if the questions do not actually measure what they were supposed to measure. Thus, it is of utmost importance that the questions given to the respondents correspond to the purpose of the study based on the explanation which the researcher has given to the interview object. Otherwise the interviewee might lose interest in answering the questions since they may feel irrelevant. (Collis & Hussey, 2014 p.218). In order to secure the validity of the research process in the scope of this thesis, methods for executing research were chosen by consulting the literature where studies in similar fields have been made. Relevant stakeholders were chosen, as stated previously, also by consulting literature on both narrow and broader subjects within city logistics as well as consulting the logistics department at the academic unit under which this thesis is being published. Furthermore, the authors being aware of the danger of making assumptions in regard to hypothetical contains, asked follow-up questions in order to understand the underlying reasons being made by a certain stakeholder which was being interviewed.

### **3.3.3 Generalization and transferability**

As stated previously, generalization is not desirable in the context of this thesis considering the aim of the research questions. Some researchers claim that it is possible to generalize under the interpretivism paradigm, even by using a single case, by capturing interactions and characteristics of the phenomena being studied. In order to do this, a deep understanding of the activities and behavior being studied is required (Collis & Hussey, 2014 p.54). However, as we are not studying any behavior and cannot be considered to have as deep understanding as someone who has been in the city logistics on the part of any stakeholder for a long period of time, in order to obtain a deep understanding, generalization is again not desirable in the context of this thesis. Although, one of the authors of this thesis has work experience on behalf of a

logistics provider, as a delivery driver, the experience is closely tied to the local context of Gothenburg. The goal of this thesis is to examine what kind of problems related to last mile delivery and the Final 50 Feet are prevalent in Gothenburg. Results obtained by this study in this particular geographic context might be used in order to highlight the types of problems at other locations, i.e. other cities as the another goal of this thesis is to raise awareness for a new research area in the logistics field. Thus, transferability, a concept closely connected to generalization consisting of applying findings to another situation being sufficiently similar (Collis & Hussey, 2014 p.172) may be subjected to a discussion, provided in the limitations chapter.

### **3.3.4 Ethical dilemmas**

Since empirical material as primary data for this thesis is gathered by directly involving existing stakeholders within the city logistics operations of Gothenburg, several organizations in the form of private companies and governmental organs have participated in the development of this thesis. Thus, it is important to consider ethical dilemmas that may occur in these kinds of cooperation. According to Collis and Hussey (2014, p.33-34), there are following ethical dilemmas that might occur in research conducted between university and private companies as well as other organizations:

- Anonymity and confidentiality
- Informed consent
- Dignity
- Publications

Anonymity and confidentiality refers to the issue of finding information which could be regarded as beneficial if sent further, to other parties (Collis & Hussey, 2014 p.33). By passing on information, the researcher might expose an employee or a supervisor for instance. This issue, in the frame of this thesis, is more prevalent to the private companies. The governmental organs produce information which is publicly available, thus confidentiality is not a concern. In the case of private companies, the interview objects always had the choice of what they wanted to share with the researchers. As stated previously, a permission for recording interviews was granted prior to the start of the interviews by the interview objects. Interviewees were also given a choice of remaining anonymous.

Informed consent is an important ethical prerequisite for conducting research with the help of interview objects (Collis & Hussey, 2014 p.34). This requirement was naturally satisfied when the researchers contacted the interview objects initially, whether it was in person or via e-mail or telephone. Another issue regarding consent that arises is that although, agreeing on participation, the objectives, especially when being observed are likely to change their behavior and distort the study's findings (Collis & Hussey, 2014 p.34). Our stand on this issue is discussion in the next



chapter. Dignity dilemma is mostly regarding the issue of people with different amounts of knowledge and authority being met, providing requirements on being courteous (Collis & Hussey, 2014 p.34). This was not a problem in the frame of this research as authors have personal working experience in various types of environments with various working tasks.

The publication issue arises due to the fact that an academic's career is developing by acceptance of his or her work which ultimately set requirements for the study results to be accurate (Collis & Hussey, 2014 p.34). Naturally, it is unethical to provide false results. Moreover, it is not acceptable to exaggerate results in order to provide a more desirable picture for the case of the study. In addition, results of a study might put individuals or entire organizations in bad light (Collis & Hussey, 2014 p.34). This issue was resolved by authors by discussing implications of including certain things in the result. It was also outlined to the interview objects that as the study takes place under the frame of a master thesis, the thesis itself containing all the primary data gathered from the interview objects, will be published. Finally, apart from considering the research ethics described above, attention was also given to responsibilities of the researcher such as: *conforming to generally accepted scientific principles, protecting the participants (life, health, privacy and dignity) of our study, assessing the risk to participants, taking precautions in order to ensure safety of the researchers and obtaining permission for contacting certain actors* (Collis & Hussey 2014, p.35).

### **3.4 MAMCA**

Generally MAMCA is used on a strategic level to evaluate policy measures (Macharis et al., 2012). Whilst last mile logistics, and thus Final 50 Feet, concerns itself with increasing operational efficiency (Cardenas et al., 2017). This might be perceived as paradoxical but must not be. The alternatives to business as usual being investigated are operational in nature and can lead to operational benefits for both the distribution companies and the city in the form of more efficient distribution and thus less congestion. However, as Dablanc (2007) stated there is a stalemate between the stakeholders as the proposed measures often do not make economic sense for the distribution companies. Thus they lack incentives to make the investments into them without the municipality either providing subsidies or creating policies that forces all distribution companies to act on an equal playing field.

Therefore, even though this thesis investigates operational initiatives, it is of utmost importance to gain a strategic perspective through a MAMCA as the operational efficiency will not be achieved without the right policy setting. Also by including as many relevant stakeholders as possible early on, hopefully the thesis can highlight the diverging preferences of the stakeholders. If the only perspective considered were the distribution companies the conclusions reached might not be feasible as other stakeholders might reject them for one reason or another. This is the reason for using a strategic tool on an operational issue.

### **3.4.1 Creation of the MAMCA model**

When conducting this part of the thesis we used the MAMCA software created by Macharis and her colleagues on the Mobility, Logistics & Automotive Technology Research Centre (MOBI) (Mamca, n.d, a)

#### *Problems and alternatives*

The goals of studying the Final 50 Feet is to reduce truck dwelling time and reduce the number of failed first deliveries. As the situation is different for each city this thesis has identified several problems prevalent in Gothenburg. These have been found through a literature review and by conducting four observations with distribution drivers operating within Gothenburg. The problems that have been identified are:

- Buildings are not designed for the kind or amount of deliveries they are receiving, either through being old or by not being prioritized sufficiently when being developed.
- High levels of congestion in streets and loading zones.
- Large amounts of construction that slows down traffic.
- Limited number of hours when deliveries can be made, being restricted both by opening hours and policy restricting deliveries during certain hours.
- Problem getting access to the building (codes).
- Finding a signee for the delivery is time consuming.
- Receiver not providing the correct care of address.

The alternatives that have been identified in the literature and that will be rated in the MAMCA framework are as follows:

- Coordinated procurement for logistics services
- Intelligent Transport Systems
- Off-Peak Hour Deliveries
- Centralized receiving stations
- Common carrier locker systems

#### *Stakeholders*

Next step is to decide which stakeholders' objectives to take into account. The spatial size of the studied transports are limited to within city limits and as the municipality has sufficient legislative power to affect the situation they are the most relevant stakeholder from the governmental side. The citizens should not be ignored but as they are not organized and due to the complexity of the subject it is not feasible to include them. However, as can be seen in the transport plan for Gothenburg mentioned earlier, the focus of the municipality is to create a vibrant city center that is attractive to the inhabitants. Thus it can be argued that the citizens' objectives are being represented by the municipality.

As the senders of the delivery is often outside the geographical context studied they have been omitted as a stakeholder. The receiver of the delivery is however within the spatial limit and is the actor that initiates the delivery. The receiver thus has influence over the demand for freight, why it is important to include this actor as a stakeholder. The distribution company is also included as they perform the actual delivery.

As some of the solutions require investments in both money and space from the property owners of the multi-tenant multistory buildings they have also been included as a stakeholder. They also design the internal infrastructure in the buildings that the distribution companies have to work within.

### *Criteria and weights*

With the relevant stakeholders and problems identified a preliminary criteria tree for each stakeholder could be constructed based on the literature review and the authors understanding of the stakeholders role. Generally, the stakeholders from the same industry or with similar interests are grouped together as the MAMCA is often performed during workshops (Mamca, n.d, b). As it was infeasible to gather all stakeholders for a workshop in the scope of this thesis they have been left ungrouped for transparency. The respondents had the opportunity to add or remove criteria from their tree during the interview if something were missing or superfluous according to them.

With the criteria tree solidified the respondents assigned weights to each criteria where the respondents gave it a score from 0-100, with a higher score signaling more importance. For the interviews conducted on the phone, a web questionnaire was used to collect weights to the criteria and ranking of the solutions, with each criteria having the scale 0-5 and the solutions 0-7. These were then entered into the MAMCA software after the interview, making the tool a bit more blunt but easier for the respondents to use when not performing the interview face-to-face. The criteria tree with the weights for all stakeholders can be seen below in appendix 6.

### *Indicators and measurement methods*

For each criteria it must be clear what variables affect each criteria and in which way. Therefore for each criteria there is at least one indicator assigned which is a variable that can be measured to see how that criteria is performing. For example, for the receivers criteria “cheap deliveries” the indicator for that is “price of delivery”. Assigning indicators ensures that the criteria is relevant for the stakeholder and that what is being measured by the criteria is understood by the respondent.

### *Overall analysis and ranking*

In step 5 the stakeholders were asked to rank the different solutions presented in the MAMCA through a pairwise comparison. The MAMCA software allows the stakeholders to do this pairwise comparison of the solutions on each criteria. Due to the time restrictions during the interviews one pairwise comparison had to be used as a basis for each stakeholder instead of one for each criteria.

### *Results*

With the pairwise comparison done for each stakeholder the software produces a graph of how each stakeholder ranks the different solutions. The graph can be found in the analysis, section 5.2. The weights that each stakeholder assigns their criteria is also a result of the MAMCA which increases understanding of the different stakeholders position.

### *Implementation*

The last step of a MAMCA is to implement a solution that benefits all the stakeholders the most, or at least not unfairly punish one stakeholder. Hopefully the findings in this thesis will be helpful in the continuation of the discussion on how Gothenburg's freight should be handled going forward.

## **3.5 Limitations**

Observations are used in order to increase our understanding of the working situation of the operators working with delivering packages in Gothenburg. However, in order for the researchers to learn the language and immerse themselves in the situation of the research subject the observations need to last for a longer period of time (Bryman & Bell, 2011 p. 495). Without being immersed in the culture for a long period of time some of the value of observations is lost. Also, as the observations only lasted for a short period each and did not recur it is possible that we were not getting the full picture of the situation and that the subjects of the observations were changing their behavior as they knew they were observed (Bryman & Bell, 2011 p.496). The observations did however provide us with an increased understanding of the distribution situation in Gothenburg and confirmation that the problems we found in literature were prevalent in Gothenburg. It also gave us the opportunity to discuss with the drivers about the research subject and ask if there were any solutions that they could think of that had not come up in the literature.

The other method for gathering of primary data used in this thesis is interviews. Although being regarded as the most suitable method considering the qualitative characteristics of the thesis, the method is accompanied by limitations as well. An interviewee may have multiple roles (Collis & Hussey 2014, p.138). Being contacted by the researchers due to a certain position, an interviewee may have several tasks within a company or with other organizations. In the case of this thesis, an example would be that one of the 3PL terminal managers included in this thesis, also takes

part in an FQP. Thus, it is important to determine from which perspective the answer is given by the interview subject, whether it is a company policy statement or a personal opinion. Another important aspect to recognize is that in semi-structured interviews, used in this case, have a strength of offering a discovery of the subject but when using them, it may be hard to keep note of the questions and answers, topics and later analyzing the data (Collis & Hussey 2014, p.208). Finally, as interviews, apart from individual observations with the drivers, were conducted using two interviewers, it is important to note that this often changes the dynamics of the interview. The upside of ensuring that all the issues are explored and that correct notes are kept (Ibid) by comparison was viewed as outweighing the risk of affecting the interviews too much.

In regard to interviews it should also be mentioned that MAMCA as an analysis method is quite time consuming for the participants in the stage of data collection. This as the participants should confirm their criteria, weigh them and also do a pairwise comparison between all the researched solutions in regard to each criteria for the stakeholder being interviewed. As much of the value from interviewing the respondents came from the more open part of the interview the pairwise comparison between the solution was done as a whole instead of on the basis of each criteria. Also with the COVID-19 outbreak that happened during the writing of this thesis all but one interview had to be conducted on the phone which also made it harder to explain the analysis tool to the respondents. However, considering all this the MAMCA framework still provided a good structure for how to attack the problem and set up the research. The respondents could through the interviews adequately present their unique position and understanding of the situation, which was the purpose of this thesis. The pairwise comparison of the solutions should however not be seen as an answer to which solution to implement. Without gathering all stakeholders the diverging views and ways of seeing things are too dispersed in order for this thesis to claim that one solution is superior to another. Had all stakeholders been gathered for a workshop for a whole day the MAMCA part of this thesis would likely have provided clearer results which solution(s) that could be implemented.

## 4. Empirical material

The empirical material in this thesis is represented by primary data acquired through completed interviews and observations. Firstly, each stakeholder will be presented based on their role when looking at urban goods deliveries as a system. Later, each stakeholder section is followed by a description of the delivery situation in the city according to their point of view. Finally, each stakeholder's view on potential solutions regarding the subject of 50 feet of logistics found in literature is presented under respective subchapter, in addition with other solutions that the stakeholder may have implemented besides the ones presented by the researchers.

Besides the interviews, the four stakeholder groups presented earlier in the thesis also assigned weights to their different business or organizational criteria related to deliveries which resulted in a criteria tree as seen below in figure 3. The criteria tree for each stakeholder can be seen in appendix 6. The stakeholders also ranked the different solutions that were evaluated in the MAMCA tool, the results from that are presented in graph 1 in the analysis part of this thesis.

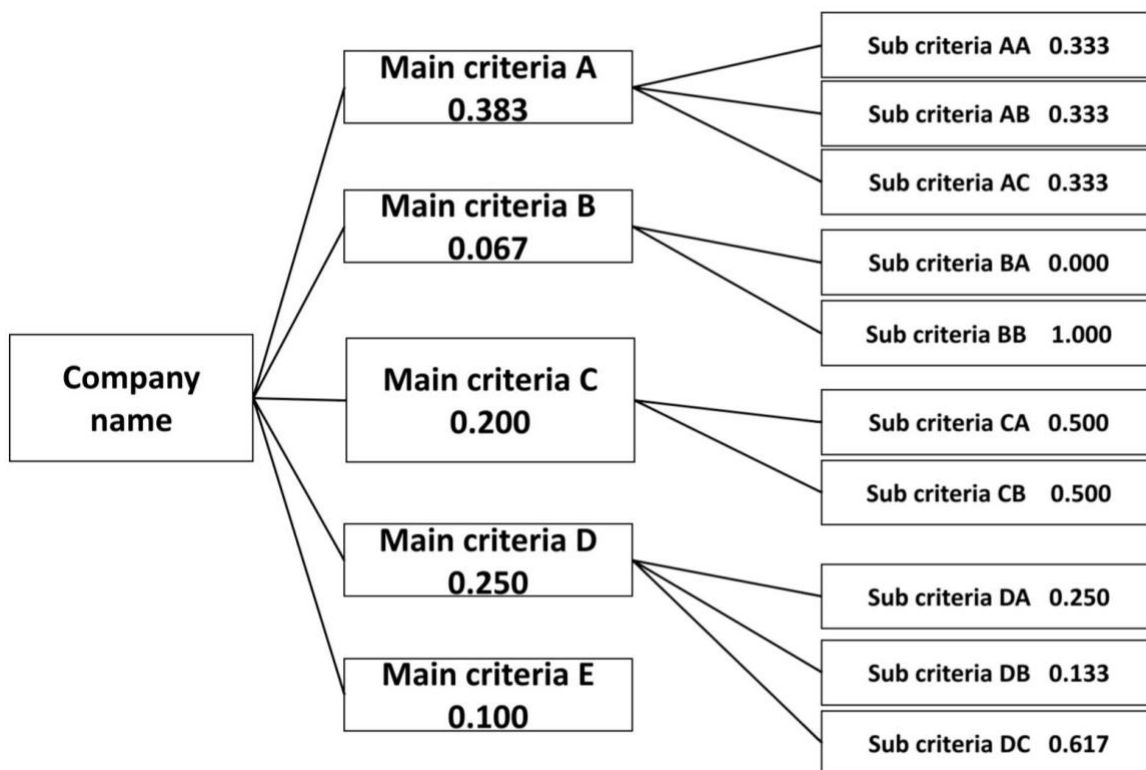


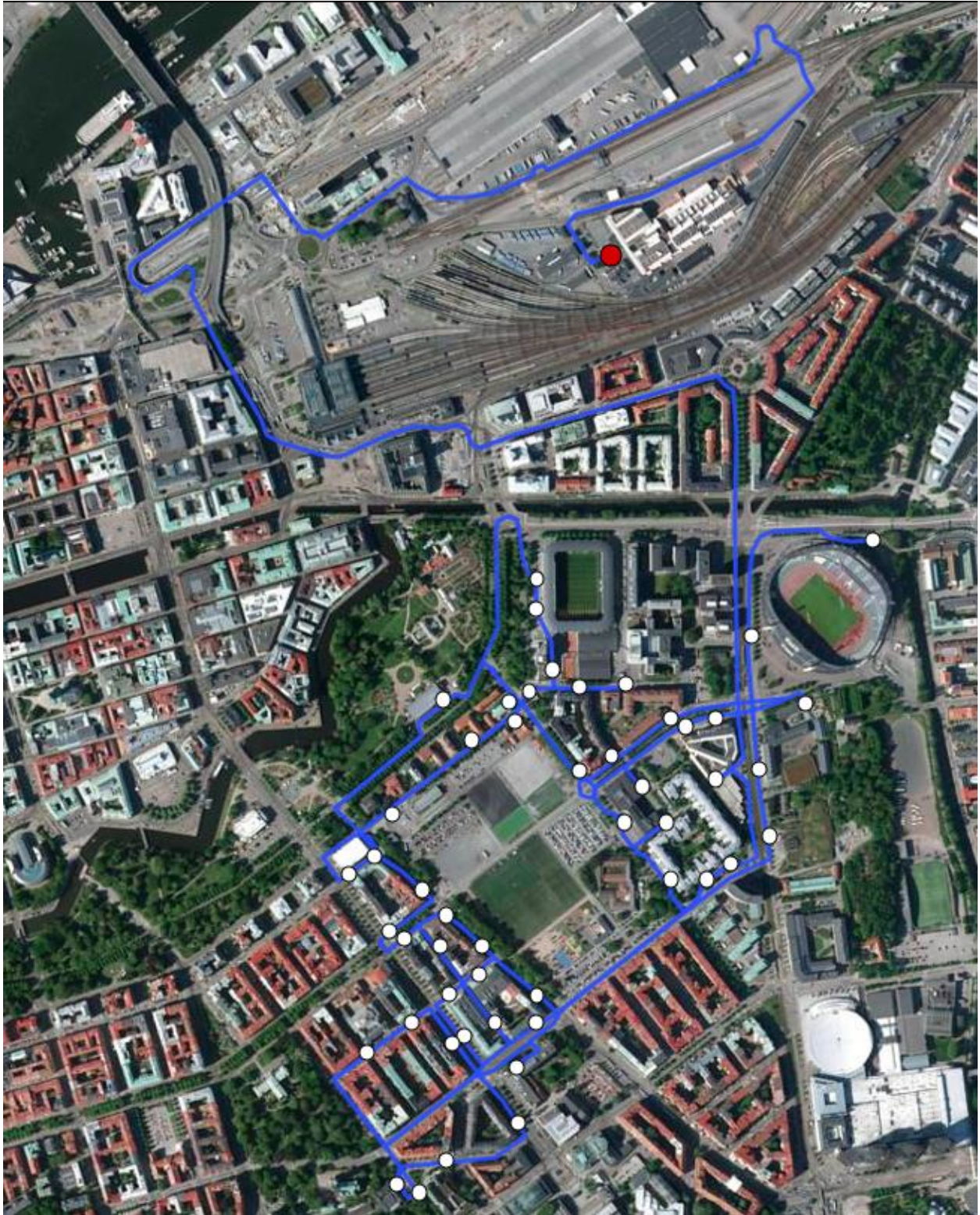
Figure 3. An example of a criteria tree created for the stakeholders.

## **4.1 Delivery Drivers**

The following section begins with a description of their respective distribution processes. Further, various distribution problems outlined by the drivers of both companies will be described followed by their views on the potential solutions for those.

### **4.1.1 The delivery process**

Activities conducted by the drivers in the case of both companies are quite similar. The parcels, about to be distributed during the day, arrive at the distribution terminal during the night or early morning. Parcels are presorted based on the postcode. In the case of PostNord, parcels arrive in cages, also sorted depending on routes or in other words, zones. Each driver has a predefined zone where he or she distributes the parcels during the day. In the case of Distribution Company A, parcels arrive in cages as well, although some of the sorting is done by the drivers themselves as the route structure is flexible with drivers being able to affect them. In both companies, the drivers sort the content of the cages according to their own personal route planning and load the parcels in the vehicle individually, in their own predefined order. An example of what a route in the central Gothenburg may look like is presented in picture 1. While being loaded, the parcels are being scanned with the PDA (Personal Digital Assistant) upon loading. The same PDA is later used during the distribution. The loading process starts between 7:30 and 8:00 in the morning and takes from 45 minutes to one hour to complete.



Picture 1. *Example Route*. The red dot indicates the distribution terminal, the route starting point. Each white dot indicates a stopping point for the distribution vehicle.



The loading process is followed by a trip from the terminal to the first receiver at the start of each driver's route, a process which in the case of the four drivers being observed in this case took from 10 to 15 minutes. However, the process is highly dependable on the location of the start of the route in relation to the distribution terminal as well as on the traffic flow. The distribution process (figure 4) is then carried out, with the vehicle stopping at the nearest loading zone or other convenient location in the proximity of the receiver, retrieving the goods from the vehicle, reaching the receiver, gathering a signature signifying completion of the delivery and returning to the vehicle. The process is being repeated up to 60 to 70 times a day which corresponds to the number of customers each driver visits each day on average. The distribution process itself may be divided in driving the vehicle, finding an available parking spot or loading zone and delivering on foot. Time division of each of these processes obviously varies a lot depending on the route and the availability of parking. On average, the researchers estimate that around half of the total delivery time on route was used for delivery on foot, a quarter for finding parking spaces and another quarter for driving the vehicle. The distribution process is carried out until midday in most cases, followed by a lunch break and continues for another two to three hours in the afternoon.

Afternoon distribution differs slightly as parcels are collected at some locations as businesses are sending goods in parcel format, either B2B or B2C. A number of collections are fixed, meaning that the driver visits those particular receivers every day, even when not delivering anything to those. Other collections are being booked with each corresponding logistics provider, usually during the same day of which the driver is notified off on the PDA. Collection may also take place in the morning, as some receivers may have already prepared the outbound parcels in advance. The driver collects those during the morning delivery. After all of the parcels have been distributed as well as all of the collections have been made, the vehicle returns to the distribution terminal where the driver unloads the collected parcels as well as the parcels which could not be delivered for various reasons. In the majority of these cases the delivery attempt fails as the receiver is not present. As the vehicle has been emptied, the driver's shift ends, usually between 15:30 to 17:00, depending on the company and the volume of parcels that particular day.

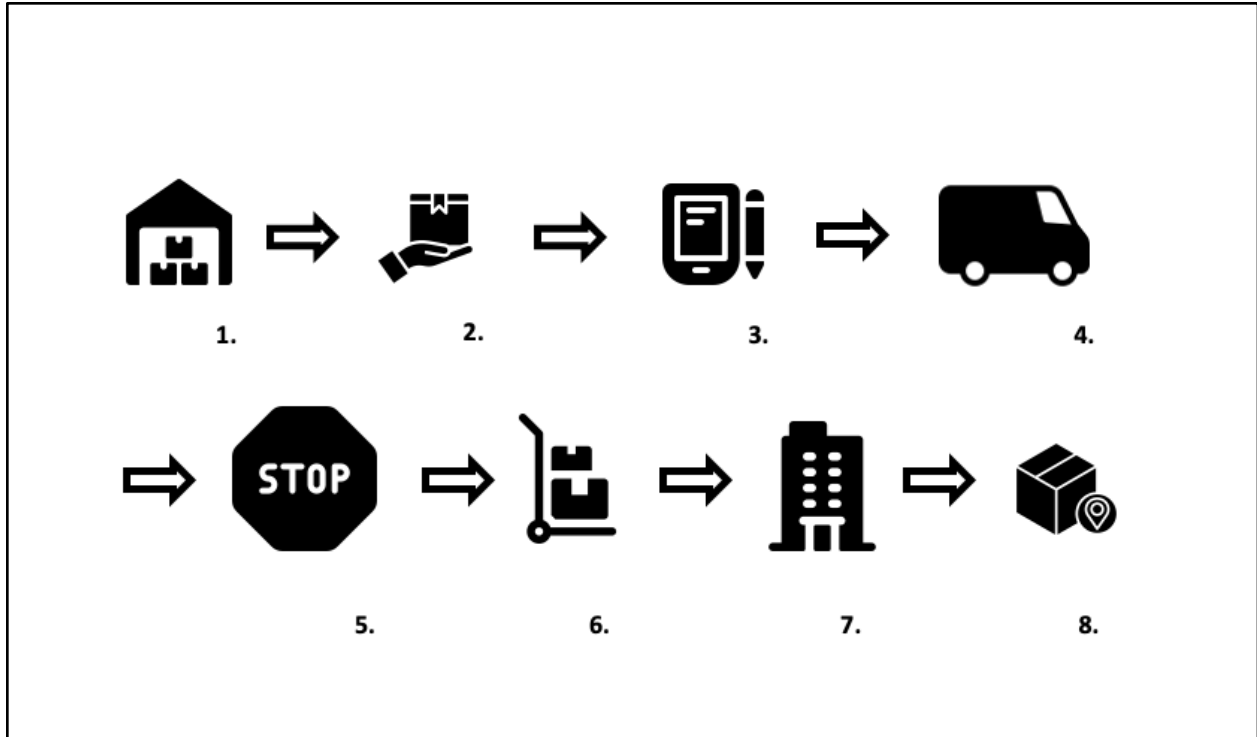


Figure 4. Parcel distribution process. 1. Arrival at distribution terminal, 2. Sorting, 3. Scanning and loading, 4. Driving from distribution terminal to the route, 5. Arrival at receiver's address, 6. Unloading parcels, 7. Searching for the receiver at location, 8. Parcel delivery. At the next receiver's address the process is repeated from step 5 and onwards.

#### 4.1.2 Distribution related problems

*The following chapter is divided in the macro perspective of transportation to the building, i.e. horizontal movement and micro perspective of internal delivery operations in a building, i.e. vertical movement.*

##### *Horizontal movement*

The major issue related to parcel distribution, according to all of the drivers being interviewed and observed was the poor availability of the loading zones and other spots for parking. This often forces the drivers to either circle around the block, waiting for the loading zone to become available or going further on their route, coming back at another time when it is hopefully less crowded. Several loading zones are also temporarily occupied by containers used adjacent to constructions, making the loading zone unavailable for several weeks or months at a time. The aspect of occupied loading zones is perceived as a stressful one since it disrupts the planning of the driver, forcing alterations on route. The aspect is also time demanding since it adds up miles and time required for reaching a receiver, either due to circling or being forced to return to that receiver later during the day. In some cases, the loading zones are occupied by other vehicles than the ones making deliveries, often private cars not making any actual deliveries or loading. However, the restrictions on utilization of loading zones are rather vague since private cars may

occupy a loading zone even if they make a pick up from a tenant or for instance deliver a document or a letter, parking in the loading zone in order to avoid paying for a parking space. Some of the loading zones are dedicated solely for the vehicles registered as lorries, where vans under 3,5t are included. However, there are far more undedicated loading zones in Gothenburg which private vehicles can use to load and unload. It was suggested by the drivers to change these to dedicated ones in order to make it easier for traffic wardens to give tickets to vehicles that should not be there.



Picture 2. An undedicated loading zone for two vehicles at Kungsporsavenyn in Gothenburg.

The issue with the loading zones also results in drivers making certain decisions. Instead of moving along the route, in case of unavailable loading zones or parking spaces in proximity to the customer, a driver might choose to double park, i.e. park on a driving lane alongside parked vehicles along the pavement. This is often done if the nearest available parking space is far from the receiver, which would contribute to a lot of time being lost. All of the drivers participating in the interviews, stated that it is impossible to complete a route within the time frame without breaking any traffic rules, especially the ones regarding the parking. Simultaneously, the drivers state that their respective operational managers and companies in general discourage them from making traffic violations. Also, if the fines are issued to the driver, in most cases they are paid by the driver as well since from the legal sense, the driver is responsible for the maneuvers that he or she makes. Drivers also state that many of the traffic wardens have a good understanding of the challenging traffic situation in the city, and are rather understanding considering the amount of fines issued to the professional drivers compared to the number of violations they make. The drivers put it as, the wardens know that they, the drivers, are working and are not in the city center for pleasure. When a traffic warden, strictly following the traffic rules appears, the drivers often know that person from their previous experiences, thus acting accordingly. The issue is

magnified by the fact that all drivers stress their limited ability to raise delivery related issues. They state that they are rarely given information regarding upcoming traffic detours related to various construction projects in the city. The requirements regarding the volumes to be delivered by individual drivers are static, while the city and its traffic situation is not, which is why some drivers feel additional pressure. When the issues are raised in various meetings, the help given by the management is limited.

Private car ownership is another issue raised by the drivers. The perception is that, while the municipality of the city has taken many decisions in favor of other transport modes such as public transport, cycling and walking in order to decrease the number of private cars on the roads, these efforts have not been enough. Many people in the city still use their personal car in order to get to and from work and get around in general which is seen as infeasible. The drivers state that while trying to reduce the number of private cars, some of those actions clash with what is required for making efficient deliveries. By making obstacles for the private cars such as rebuilding streets to walk paths, one way streets and banning certain turns, the delivery vehicles are being restricted as well. While being restrictive, these efforts are not perceived as sufficient either because a lot of time designated for delivery is still being wasted on waiting in traffic.

#### *Vertical movement*

Apart from the loading zones, other operational difficulties in regard to the Final 50 Feet have been recognized by the drivers. Access to some buildings might be difficult since the receivers, both private consumers and businesses are not always available at the time of the delivery. In the case of private consumers, there are many failed deliveries due to unavailability but also due to incorrect security door codes provided to the driver via the shipper, buying the transport service. In Gothenburg, a large number of business tenants in the central Gothenburg operate in buildings with a security door at the entrance, equipped with an intercom and/or security code lockers. In the scope of this thesis, the businesses were naturally observed closer. Although, the businesses in general are better at responding to the driver via an intercom, some businesses are bad at providing the correct information about their address. Businesses update their company names and locations at some point, but the update of such information in the intercom system as well as signs indicating the position within the building (floor level) is slow. In many cases, the information is incorrect, forcing the unfamiliar driver to either search for the company within the building or decline the delivery altogether if the name of the company cannot be found in the intercom system, thus eliminating access to the building. This also results in unnecessary time consumed by vertical movement. There is the option of calling other tenants in the building, but this is rarely done by the drivers. Regarding the private consumers, many people, at least in Gothenburg, live in secondary owned apartments. The signs at the entrance and at the door usually indicate the name of the owner of the contract for the apartment. The secondary owner must therefore use a care of address, something which some tenants fail to do when ordering their parcels, making the receiver hard to locate. There are also a number of small enterprises

operating from the owner's homes, for instance their apartments, also failing to provide the shipper with a care of address.

Multi-tenant buildings in Gothenburg operate very differently regarding the way they receive their goods. Several multi-tenant multistory buildings, visited during the observations, did not have a reception which is why the driver was required to reach the tenant at their location in the building in order to deliver the parcel. Although a number of buildings did have a reception, its purpose is solely administrative, acting as a help desk for visitors, not accepting any deliveries. The driver might use the help of the receptionist in order to obtain the location of a certain company or person. Buildings with an operational reception also tend to be very accessible since the entrance doors are open for everyone to entry.

In central parts of Gothenburg, many buildings are over a century old which results in various limitations for the delivery, predominantly regarding the vertical movement. The accessibility of these kinds of buildings is poor, since they are rarely equipped with an elevator, which is rather problematic when delivering several parcels at a time on a trolley. Although some of the older buildings may be equipped with an elevator, these elevators are located on the first floor, with a staircase leading up to the first floor from the street level. This forces the driver to drag the trolley on a staircase before reaching the elevator, or to carry one or two parcels of a larger shipment at the time, making several trips from the car to the elevator and back. Elevators in older buildings also tend to have very limited capacity, as they were installed long after the completion of the building, the design of which was not supposed to support an elevator at all.

One of the most frustrating aspects of the deliveries to buildings with poor accessibility as described above is that the tenants in these kinds of buildings tend to order heavier parcels, such as for example office print-out paper in bundles. These may weigh up to 35 kgs per bundle, often ordered more than two bundles at a time. The drivers believe that this is mostly done since the tenants themselves would like to avoid these kinds of lifts. During one of the observations in the case of this research, one of the drivers was greeted by a tenant with the words "*Good, now you have your daily exercise done*", not realizing the struggle of the driver. These kinds of bundles as well as other packages, often with office material tend to be shipped in poor packaging, not being able to cope with the sorting and overall parcel handling very well, adding to this frustration expressed by the drivers, resulting in an additional discussion about the condition of the parcel with the receiver on site.

A number of new buildings, built mostly in the 21st century, are also problematic for the delivery according to the drivers. The different designs of the buildings have a great impact on the amount of time required for the delivery. Adopting different receiving practices also have an effect on the efficiency of the deliveries. Sadly, there are examples of rather new buildings with poor practices. In one case, observed by the researchers, the delivery process of a parcel in a

multi-tenant office building took eight minutes from the time the vehicle had stopped, compared to two to three minutes in other cases on average. The longer time required was contributed by the fact that the driver had to take two different elevators, with an additional walk between them, before reaching the receiver's office. On the other hand, in another multi-tenant building, a centralized receiving station was in place, with the parcels being distributed by the janitor after the deliveries by various logistics providers have been made during the morning. Delivering parcels to that particular receiving station and acquiring a signature by the receptionist took only about two minutes. Another interesting observation was made at a construction site, where a reception at the entrance to the construction site was set up for receiving goods, thus relieving the delivery drivers from being forced to walk around the construction site, searching for the right person to sign, saving lots of time while making it a safer environment for the driver to visit.

### **4.1.3 Views on solutions**

Discussions regarding solutions for the Final 50 Feet of urban goods distribution from the literature were conducted with the drivers. The summary of the views for each solution are presented below.

#### *Centralized receiving stations*

The first solution - centralized receiving stations is perceived as a desirable solution due to the potential time savings if applied in some problematic buildings in Gothenburg. During the discussion with one of the drivers a comparison was expressed. When comparing two similar buildings, one with a centralized receiving station and one without, the latter might require up to 30 minutes to deliver to five tenants depending on the volume and number of parcels. On the other hand, in a building with an adopted centralized receiving station, all the parcels are dropped at the same place in the building, signed by one person, taking no more than three minutes and delivered internally in the building, for instance by a janitor.

#### *Off-Peak Hour Deliveries*

OPHD are also regarded as a rather good solution, but it requires quite a lot of involvement from the receiver which the drivers are skeptical to. Even if the drivers themselves would be prepared to work at later hours, they don't believe that the receivers would go as far as investing in these kinds of solutions, either in manning the facility or to invest in unassisted ones. The drivers state on the other hand, that OPHD could be made by starting deliveries earlier in the morning. Currently, many businesses such as stores, banks and restaurants open rather late, from ten to eleven o'clock in the morning. If these facilities would have been able to receive goods from eight o'clock in the morning, it would have made a big difference according to the drivers. On one hand, more loading zones would have been available while the delivery vehicles could have left the city earlier before the afternoon rush, thus resulting in more delivery time being used efficiently. This method would require assistance from the receivers' staff or other types of

investments. The drivers understand that while also believing that the benefits of this would be greater than costs.

### *Intelligent Traffic Systems*

The view on implementation of Intelligent Traffic Systems was mixed. Most of the drivers agreed on the fact that various solutions such as providing the information regarding availability of the loading zones would be helpful but perhaps difficult to implement. The already complex route planning would become even more complex due to the number of variables the system would have to take into account. Drivers believed that not only these systems would be too expensive to invest in, but also inefficient since a driver operating on the same route would have sufficient knowledge regarding the route in terms of opening hours, drop-off points and such which would be difficult to feed into a system. In addition, these systems would have to be extremely accurate in order to make sense, which would not work if it would be based on GPS, since it has an error margin of several meters.

### *Coordinated procurement*

Coordinated procurement was seen as an example with quite illustrative benefits since the number of vehicles would reduce but also as rather unrealistic in terms of if they would be applied. According to the drivers, many companies in multi-tenant buildings, although being neighbors do not cooperate much, thus a solution requiring them to do just that may be challenging to implement. The change has to come from the demand side. The demand side is represented by the customers, both private or business customers which are used to a certain level of service without putting any effort such as coordinating their purchases. Considering the fast development of e-commerce, the backbone of the parcel deliveries, some drivers state that the receiver does not appear to believe having any responsibility but only an expectation of obtaining the purchased product as soon as possible, making virtually no compromises.

### *Common carrier lockers*

The opinions on implementation of common carrier lockers was also somewhat divided. One of the drivers stated that they are hard to fit into the older buildings in the city center, partly due to the building design and lacking sufficient space for those at the entrance. One driver also suggested that “*the lockers would have to be designed in such a way that they would not stand out too much in the older buildings in the central city*”. Putting more smaller parcels in the letterboxes at the entrance, which is already being done by the postal services branch of PostNord, seemed easier. Other drivers did see the potential gains of such a solution, being fundamentally close to a centralized receiving station in terms of being a drop-off point. However, the boxes have limited capacity, and would be insufficient for the volumes that some multi-tenant multistory buildings receive today. By delivering to common carrier lockers one of the pleasant aspects of the profession of parcel delivery driver, meeting the customers, would be reduced. The drivers believe that the social aspect being reduced could decrease the

attractiveness of the profession. However, this may be seen as a necessary evil since the overall working conditions, by reducing the heavy lifts on the staircases and other locations, would improve.

## **4.2 Operational managers at 3PL companies**

Both the manager at Distribution Company A and PostNord lifted their drivers as a vital asset to the company and valued their skill and competence at their jobs and prioritized their working environment highly. The manager at PostNord was more concerned of the weight and volume of packages that the drivers had to carry when delivering to multi-tenant multistory buildings than of the loss of efficiency by having to go up and down the building several times by dividing up the deliveries between the tenants. However, they did both acknowledge that it is a fierce business environment and that the industry can be rough on the drivers with high expectations on them to perform their job well. Simultaneously, it is a physically demanding job while the understanding from other stakeholders regarding their working environment is limited. The manager at Distribution Company A would like to see efforts to make the job of delivery driver to be seen as more of a status job, as it is a demanding job with a large share of responsibility requiring the drivers to be able to plan their own routes, be flexible and adopt and solve most situations that arise during the day individually.

The drivers and the vans they are driving are seen as an important way to market the company both as the vans are seen in the city but mostly in the meetings with the customers. They are the face of the company and even though the managers acknowledged that they are providing a budget service that no one wants to pay extensively for, they are keen on providing excellent customer service while not missing deliveries, which is seen as vital to their business. As there are several actors providing the exact same service and it is hard to differentiate the service, their particular company has to work with high customer service in order to retain business. The manager at Distribution Company A explained this by stating that they are quite expensive in relation to their competitors but that they have loyal customers due to the fact that they are trustworthy in their delivery process and provide good customer service. The mentality of both managers was that the customer is always right and that deliveries should be carried out independent of which obstacles that are present. The manager at PostNord did state that with the rise of e-commerce, home deliveries to private persons have increased in importance in relation to business customers.

Both companies were satisfied with the level of communication with the municipality regarding changes happening to the infrastructure in the city and how construction work will affect the road network. The manager at Distribution Company A is a member at the FQP network and promoted this kind of collaboration as a fantastic way to collect the different stakeholders and to have an open discussion about how to reach consensus on the problems related to freight in the city that are accepted and understood by all actors without getting into “my and yours”. The



manager at PostNord, who is not a part of these meetings, did feel a lack of communication channel back to the municipality and decision makers in the city, lacking the proper channels to communicate the information and knowledge about their industry back to the decision makers.

#### **4.2.1 Distribution situation**

The concept of the Final 50 Feet of urban goods distribution is not seen as a problem from the managers perspective in the case of multi-tenant multistory buildings in Gothenburg. The manager at Distribution Company A says that most of these buildings have sufficient logistics solutions and the manager at PostNord did not see it as a problem with drivers going up and down a building to complete several deliveries. The manager at PostNord mentioned nursing homes and health centers as more problematic destinations that are ordering large quantities but that are not large enough to be sent on pallets. They also ordered their goods at similar times, creating spikes in the demand for distribution companies.

The views on the loading zones in the city were that the amount of those was sufficient and that the real problem were private cars occupying those spaces illegally. The manager at Distribution Company A stated that loading zones are mentioned on the FQP-meetings and thus he had the possibility to affect the planning regarding these. Apart from this situation, the view of the manager at Distribution Company A regarding the possibility of affecting the rest of the infrastructure related to the delivery process, whether that was inside or outside buildings, was not something that they had reflected over extensively. Gothenburg with its old city center and many buildings being constructed before this modern way of delivering parcels became a reality, are not built with these kinds of deliveries in mind. This does not discourage the managers though as they are both adamant that deliveries should be performed with high service, high efficiency and at the time slot that customers expected even if the infrastructure was not supporting this. Neither of the managers saw any real possibility in affecting the ordering or receiving routines at the receivers' part as they had limited dialogue with them and no real position to make demands.

The magnitude of construction that is happening in the city is seen as a disruptor to the delivery practices. Even if they are receiving information about what is happening the manager at PostNord outlined that *“the municipality is good at informing regarding what it is going to do and how but not regarding how we (the carriers) are supposed to solve it”* in terms of complying with the new detours for instance. This information could also be distributed at an earlier stage making it possible to increase the planning horizon. In the current situation, the capacity of the infrastructure can change drastically without any longer time to plan the change to their operations. The interview with the manager at Distribution Company A did not touch upon this subject.

Both managers agreed that the delivery windows inside “vallgraven” (the most central part of the city) were too small with stores opening up at 10 am and no deliveries except for Stadsleveransen being allowed after 11 am, leaving only one hour for all of their deliveries to be made. The managers felt that these kinds of time restrictions showcased the lack of understanding for the needs and necessity of freight transport by the municipality. The customers also request a short, consistent delivery window whilst the distribution companies want flexibility as they can use it to increase their operational efficiency.

One aspect that the manager at PostNord mentioned as problematic is getting a signature for the parcel as according to them it was quite common that receivers did not want to sign for deliveries as they thought that the signee had to be the same person that ordered. This kind of confusion and having to wait for a company representative to sign for the delivery could be frustrating and cost an unnecessary amount of time. It also happens that receivers sometimes abuse this signature procedure and with the legislation being in favor of them the distribution company has little possibility to combat these kinds of abuses. Both company managers agreed on the importance of minimizing the amount of missed first deliveries as these trips are unnecessary and only add costs while damaging the relationship between the distribution company and receiver.

#### **4.2.2 Views on solutions**

As mentioned earlier, the manager at Distribution Company A was part of the FQP meetings and raised them as a great opportunity to talk with other stakeholders and put forward that the discussion rarely focuses on “mine or yours”. The discussions aim to highlight the issues facing the industry and how to solve these together. No concrete examples could be given of implementations that had come out of these meetings but rather the focus was on these discussions and gaining a deep understanding of the different stakeholders positions.

A point that both managers agreed on is that they wanted to see actions from the municipality that limited the amount of private cars that were active in the city center during the hours they were operating. This, as they were seen as driving up the congestion on the streets, occupying the loading zones and generally making it harder to perform efficient deliveries in crowded city centers. The manager at Distribution Company A wanted to go even further and wanted the municipality to prefer the more serious delivery actors that had higher levels of utilization in their vehicles over actors with lower utilization in the city center.

The respondents had different views on the effectiveness of Stadsleveransen with the manager at PostNord seeing it as being a good practice to minimize the external costs created by urban distribution. Besides that, the company does not receive any benefit from participating in the scheme. They are also paying for being a part of Stadsleveransen as well as bearing all the cost for getting the goods up to the handover point. However, the manager was content with this as it was for a good cause while the competitors had to adhere to the same situation, not giving

anyone any unfair advantage. The manager at Distribution Company A had similar views when it came to the lack of benefits achieved by participating in the scheme and did not consider it a long term solution as it does not pay for itself and is subsidized by the municipality in order to cover the costs.

#### *Centralized receiving stations & common carrier lockers*

An example outlined by both respondents as a good solution to the Final 50 Feet issues were construction sites where all deliveries to the different subcontractors active on the site were delivered to a container or similar unit, which was easily accessible. Similarly, both respondents were generally positive to centralized receiving stations in multi-tenant multistory buildings and having their responsibility end at having delivered to the building. Leaving the vertical distribution inside the building to the reception or to a designated receiving function in these kinds of buildings to minimize the amount of time spent on foot locating the receiver. The same level of enthusiasm was not expressed for centralized receiving lockers. The reasons for this was that it could be an eyesore in old buildings, the lack of space for it in many buildings and the cost associated with developing and implementing such a solution.

#### *Off-Peak Hour Deliveries*

The practice of delivering off-peak hours was seen as possible if done earlier in the morning instead of at night. Managers stated that due to upstream configurations of distribution systems, night time deliveries would mean that goods would need to be held at the distribution terminals for almost a full day whilst waiting for the night to be able to deliver. Starting deliveries earlier was however seen as greatly beneficial but was not possible to do efficiently in the current setting, with a large share of the receivers in Gothenburg not having any staff on location before 10, limiting the benefits of starting earlier as they would have to circle back to complete all deliveries on many streets. The manager at Distribution Company A also mentioned the fact that many areas in the city center are mixed between residential and commercial, making it hard to deliver at night time without disturbing residents.

#### *Coordinated procurement*

On the practice of coordinated procurement of logistics services, the managers diverged in their views. The manager at Distribution Company A saw it as unlikely that different companies in the same building would be motivated to coordinate their purchases to lower the amount of freight vehicles that would visit the building. The manager also pushed on the fact that the distribution is being booked by the sender and not the receiver, thus making it even more complex to get the coordination right as they have little to gain from what would need a lot of time and planning. The PostNord manager did not go into these problems but instead said that it would be great if something like this could be coordinated, but that the consolidation must happen further upstream in the process for it to have any positive effect. If the consolidation is supposed to

happen at the cross-docking terminal in the city, it would be detrimental to the purpose as it would just increase complexity instead of decreasing it.

### *Intelligent Transport Systems*

The benefits of investing in most kinds of ITS systems were considered to be mostly marginal by both managers. In the example of route planning systems that could update the route in real-time according to the traffic situation were not deemed to be as effective and flexible as the drivers, according to the manager at Distribution Company A. Even if there could be some benefits the cost for the system would be far greater. The manager at Distribution Company A stated that “*I think it (ITS solution) is a bit far-fetched since the buyer of the goods is not the one deciding who will transport those, it is the one who sells the goods*”. Thus, it is not a carrier who is supposed to implement these kinds of technologies. The manager at PostNord knew that the company is investigating these kinds of route-planning systems but this process is in its early stages. They were also not focusing on the real-time updating rather than having the route-planning done early in the morning before the drivers arrived at the terminal. Having the routes done earlier would allow them to have increased flexibility in being able to move around vehicles and drivers between different zones and terminals. The situation today is that they have zones with cages that are filled up and the driver distributes in the zone that he or she has. With these kinds of systems the borders of the zones could be adjusted to the demand for the day and thus facilitating a more even division of labor between the employees and minimizing demand spikes.

Having the drivers getting notified when loading zones were free or not was also not particularly well received with the manager at PostNord saying that this could lead to an even more stressful working environment for the drivers. The manager continued by explaining that it could have detrimental effects on the effectiveness of route planning if a driver was to sacrifice the efficient route and increase total distance driven in order to try to catch a free loading zone. The manager thought that installing adequate loading zones for every address would be problematic and would be more positive if delivery vehicles could park directly on the pavement in front of the building they are delivering to.

## **4.3 Municipality**

A freight traffic manager from the traffic board at Gothenburg municipality was interviewed. The respondent worked with freight traffic and goods handling on the municipal road network on a strategic level. The interviewee is also a member of the FQP network and contributed there with its knowledge. The interviewee will henceforth be referred to as the freight traffic manager.

### **4.3.1 Distribution situation and the role of the stakeholders**

The traffic board and the municipality is in the context of freight traffic working to increase the social benefit for the users of their infrastructure, i.e. the residents and the businesses operating

within the city. The municipality does not in this context focus on monetary incentives or optimization goals. Instead, the focus is on ensuring that there is enough extra capacity to minimize congestion and other negative external effects. The main way that the traffic board achieves this extra capacity is with behavior change rather than increasing infrastructure. The municipality has also started evaluating its possibilities on affecting the goods flow in general, for example with e-commerce which generates a lot of stress on the infrastructure. The municipality is however keen on not disturbing the distribution networks of the larger retail chains as these already have efficient goods distribution networks.

The road network in the city is divided into the government owned and the municipal network. The government owned roads are the highways going through the city and the rest is for the municipality to govern. Companies active in city distribution use both of these road networks to distribute within the city. Congestion used to be a problem around ten years ago on the municipal roads according to the freight traffic manager but has diminished due to hard work on improving the infrastructure, changing behavior and differentiating the goods flows the last six years. An example of such differentiation is Stadsleveransen which, as described earlier, consolidated parcels to businesses within the city core, “vallgraven” area, are being distributed with smaller electric vehicles. Due to these improvements the congestion on the municipal road network has improved significantly and congestion is now more prevalent on the government roads. The traffic manager exemplified this by stating that “*the road section from Mölndal or Kallebäck all the way to Bäckebol (E6 motorway through Gothenburg) is the most congested stretch of road in Sweden*”. However, reconstruction of roads may lead to spikes in congestion. An example that had large effects is when one of the bridges leading to the city center, the bridge of Rosenlund, was being rebuilt which reduced the access points in and out of central parts of the city.

The freight traffic manager outlines the short sightedness and a focus on quick payback times on their investments as a hindrance for a positive societal development when it comes to buildings. The freight traffic manager states that the municipality and the property owners together have a responsibility for the development of the city. If the focus of the property owners is on being able to resell their properties a couple of years after being built with a profit, then the long term logistics solutions might be one of the things that suffer in quality. The freight traffic manager states that there are a variety of different ways to design the goods receiving stations for larger properties but that the costs of these vary greatly. By building freight streets, as for example in Nordstan with 1,3 km of underground freight street, it is possible to remove some of the congestion on the streets and also create a more attractive environment for other citizens. These kinds of solutions do however increase the costs for the developers without them receiving any clear benefits according to the freight traffic manager, except for the possibility to use this space for parking as well. Massive investments like freight street are impossible today since “*necessary margins don't exist, long-sightedness is disregarded while a quick yield is desired instead*” the freight traffic manager explains. The representative would also like to see more cooperation

between the municipality and property owners to create solutions that would foster city centers free of motorized vehicles. This could possibly increase revenue for shops and have other beneficial effects for the citizens, as have been seen in other parts of Europe according to the freight traffic manager.

City logistics is regarded as a very complex subject with many parts creating a complicated system. There are different forms of freight (pallet and parcels), different transport modes (van, bicycle, truck, consolidated such as Stadsleveransen, etc.) and different users of the infrastructure (private cars, pedestrians, freight operators and public transport). Changing one part of the system has effects on other parts which makes finding suitable solutions complicated as there are a lot of variables to account for. The respondent mentions that national investigations into city logistics sometimes falls short of taking this complexity into account when researching similar problems. The reason for this according to the respondent is the general lack of understanding for freight questions on both municipal and national level. The freight traffic manager explains that there are many talented people working in logistics in Sweden but that most end up in private corporations where they work with narrow fields such as warehousing or strategic purchasing. There are very few people that work strategically with the whole freight flows. The municipality is currently working on a new more in-depth freight transport plan, similar to the one by TfL, with the hope that this will increase understanding for the situation. Apart from the new transport plan in progress and Stadsleveransen, the manager states that *“the work regarding city distribution in Gothenburg has halted quite significantly lately. I’d have to say that hardly anything has happened”*.

The traffic freight manager points out that the different stakeholders involved in city logistics have different drivers and motivations. There is a lack of understanding for the motivations of the other stakeholders regarding freight, even at the highest decisions organs of the stakeholders. The freight traffic manager states that the starting point for everyone involved should be that the other party is not thinking wrong, but rather different. The freight traffic manager thinks that if this would be achieved, a trust could be established and cooperation between the stakeholders would benefit greatly. Right now, one of the problems for implementing change is how costs and benefits should be distributed, as these are not evenly distributed between all stakeholders.

#### *Power of the municipality*

As the municipality is a large organization and freight is affected by many variables, the responsibility of decisions that affect freight is spread over many different desks. The freight traffic manager does not have any mandate to discuss how the municipality views private cars in the city and what the plan is for those. Nor does the freight traffic manager have the mandate to affect the building permits when it comes to the minimum requirements of how goods receiving should be handled, as it is handled by another board of the municipality. This division is further showcased by the fact that moving vehicles that break traffic violations is a question for the

police but when the freight vehicle stops in a loading zone it is a question for the parking warden which is under the responsibility of the municipality. There is also no gray zone for the municipality when it comes to which actors are able to use the infrastructure as they must work under equal treatment principle. Thus they have no mandate to exclude distribution companies that are driving around in the city center with low levels of utilization in their vehicles, for instance.

Regarding the infrastructure in the buildings the freight traffic board has no mandate. They own the land which property owners build upon but here the decision power is on another part of the municipality which handles the building permits. The freight traffic board does however have full ownership of the loading zones, dictating the amount, the size and where they are located. They evaluate all these once a year but the freight traffic manager mentions that these are quite static as shops do not move around that often and that the need for loading zones does not fluctuate that much. From the traffic board's perspective these are adequate for the amount of deliveries that are done in the city. One problem that they are aware of regarding these is that there are many private cars using them. In ordinary loading zones a car is allowed to use for 20 or 30 minutes while loading and unloading, the freight traffic manager was unsure about the exact time, leading to them being abused. The municipality advocates that loading zones should only be allowed to be used by trucks, making it easier for parking wardens to give tickets to private cars using them.

The freight traffic manager has been a member of the FQP network since its start in 2007 and describes it as a great opportunity to interact with other stakeholders. The FQP network in Gothenburg is one of the few FQP networks in Europe with such a high level of decision power as many of the around 35 people meeting are CEOs, business executives, high level decision makers in the municipality, esteemed researchers from academia and also important local politicians. This involvement from companies in different industries, researchers and other decision organs makes this a great forum for discussing solutions, as they are supposed to be a solution oriented network according to the traffic manager.

The complexity and lack of people involved in freight questions contributes to a slow process of implementing changes to the urban logistics and finding new ways of delivering goods. There have been little changes done the last couple of years in this area and a lack of understanding of the complexity by politicians could also be a hindrance. Albeit that there has been a similar lack of progress in Stockholm in the same time period except that they have implemented a couple of car-free streets according to the traffic manager.

### **4.3.2 Views on solutions**

The freight manager is positive towards finding a solution and mentions that there is a huge variety of different solutions to problems related to freight in cities, they are just at different

levels of maturity. Some of the solutions might sound great on paper but need more time before they are feasible to implement in a real world business setting. The freight manager continues by pointing out that they might very well be possible to implement today but that they have to be seen from all the different perspectives and that therefore there are no simple solutions as they have to be reasonable for all the different stakeholders.

For a solution to be implemented there also has to be a will from the stakeholders to do this. Thus, the freight traffic manager did not give any of the solutions a weight in the pairwise comparison in the MAMCA, as a solution which might not be mature enough might receive the highest score as there was not enough time in the interview to go into all the different interdependencies. The freight manager further explained that a solution which might be seen as the most important by one stakeholder might not be seen as a feasible solution from another. If these stakeholders cannot agree on a specific solution then the whole project fails as stakeholders cannot agree on a certain solution. Some of these solutions might also not give a stakeholder any benefits today but rather down the road in a couple of years which makes it hard to motivate companies to do the investment.

Solutions that look great from a theoretical and governmental perspective can fall short because the solution fails to account for a variable for a certain stakeholder or just not provide any benefits to one stakeholder. Here, the freight manager mentions that it is important to account for the *distribution key* between the stakeholders, how costs and benefits are distributed between them, for all stakeholders to be motivated.

#### *Off-Peak Hour Deliveries*

The freight traffic manager was positive towards the implementation of OPHD as it could remove traffic from times when the infrastructure is used the most, before noon, to other times of the day. There are obstacles for implementation of OPHD in the eyes of the freight traffic manager. If OPHD is to be manned there must be someone at the location to receive the goods which increases costs for the receivers. These costs could be lowered by implementing a solution that has been done in parts of the United Kingdom where a guard opens up the delivery locations for the distribution driver so that each location does not need staff present for deliveries.

#### *Intelligent transport systems*

When it came to ITS and implementing for example signaling systems for the drivers when loading zones were free could lead to a stressful environment for the drivers as it could become a stick and a carrot situation. The freight traffic manager was more inclined towards having enough extra capacity in the system so solutions like this would not be needed. During this discussion the freight traffic manager mentioned “gångfartsområden” or living streets as a replacement to loading zones that could be implemented in more areas. Here, all traffic users share the same space and all vehicles can only travel at walking speed, especially as pedestrians



don't move out of the way of vehicles on these streets, the freight traffic manager pointed out. One of the benefits of these living streets is that distribution vehicles can stop right outside the delivery location and thus minimize movement on foot. Another benefit is that the low speed on these streets self-regulate the amount of private cars on them. An example of such a living street is shown in picture 3 below.



Picture 3. “Gångfartsområde” or living street at Vallgatan in Gothenburg

*\*Note: The blue and white sign to the right in the picture shows that this is a living street and the sign under shows the time restrictions for distribution vehicles inside of “vallgraven”.*

### *Coordinated procurement*

The freight traffic manager thought such a solution could be beneficial in some cases where it could be done on a larger scale where there are lots of tenants under the same property owner, such as city malls as Nordstan. If it could be implemented on a large enough scale it would be greatly beneficial but the municipality has no mandate to implement such a solution.

### *Centralized receiving stations & common carrier lockers*

The freight traffic manager did not give a conclusive answer on these as the municipality did not have any mandate inside buildings. As stated in the beginning of this chapter, the freight traffic manager was positive towards the amount of solutions but not all solutions are mature enough for full scale implementation.

## **4.4 Property owners**

Two large property owning companies have been representing the stakeholder property owner in the scope of this research. The companies are, as stated earlier in the methodology, Vasakronan and Castellum. Two representatives from Vasakronan were interviewed simultaneously, one property manager and a business developer with logistics as an additional responsibility. At the second company, Castellum, its chief of logistics was interviewed. All of the participants are also members of the FQP Godsnätverket in Gothenburg, occasionally participating in the meetings, thus having an insight in the points of view of other stakeholders participating in those meetings as well.

### **4.4.1 Distribution situation**

The representatives of Vasakronan state that, as deliveries generate various externalities, a way to make a city more attractive is to reduce the amount of movement and transportation with heavy vehicles. Preferably, they could be replaced with quieter vehicles as well as the frequency of the deliveries would be reduced. As of today, the restrictions on heavy vehicles are rather few, making it possible for almost any heavier vehicle to enter the central city. In order to reduce these kinds of movements, the fundamentals of the supply chain related to deliveries in the city has to be altered, by setting up small hubs around the central city, in order to be able to use other types of vehicles for final distribution. Both companies are keen on providing space for these hubs. Working with these issues is of utmost importance according to the representatives, considering the sustainability profile of both companies. The way to do this, from the point of view of the property owners, are the contracts negotiated between them and their customers, the tenants. *“A contract has a vital governing role, which we can use in order to negotiate how a tenant is allowed to behave”*, as one of the Vasakronan representatives explained. The contracts are heavily regulated, consisting of various rules which is the reason why contracts could be conducted in a way, forcing the customers to use certain solutions regarding for example, disposal services but also logistics.

### *Structural issues*

Although various projects regarding deliveries to facilities, including office buildings have been initiated by the property owners together with other stakeholders, there is a dilemma according to the logistics representative of Vasakronan. The market for logistics services contains many different logistics providers. Although there are four large providers, retaining most of the

market for parcel deliveries, all of those companies would like to increase their market shares and are not likely to cooperate. Various cooperation between them could reduce the number of freight trips but none of them is interested in that since *“all of them would like to deliver their packages to the premises”* as for them, the carriers, it is all about the volume, the representative of Vasakronan explained. In order for the projects initiated to reduce the number of trips to the office facilities to have a major effect on the delivery situation, the cooperation needs to involve several logistics providers at once.

The FQP Godsnätverket is regarded as being a good platform to partially diminish the problem of discrepancy of the objectives that various stakeholders may have. The platform allows for an understanding of a broader representation of various problems, for instance regarding deliveries in the city. In order for initiatives regarding improvement or reduction of deliveries to take place, the representatives at Vasakronan believe that apart from having a good understanding of each stakeholder's needs, the property owners, together with the municipality are the stakeholders which have to take action. This is the case since the two stakeholders have clear incentives regarding last mile and Final 50 Feet deliveries. The property owners, as stated above, are interested in operating in a city attractive for its customers, as well as having an attractive environment in proximity to its facilities while the municipality naturally has the goal of making the city an attractive place for living and working. However, having solely the municipality and the property owners is not enough. Broader cooperation has to be flourished, in order for the solutions to have a serious effect on the delivery situation in terms of reducing the negative externalities to a larger extent. Therefore it is important to understand how to attract the other stakeholders, or several representatives of a stakeholder, for instance several logistics providers, and that is why participation in the FQP is perceived as crucial.

#### *Other issues*

As of today, no measurements are being taken in order to reveal the amount of freight trips that the facilities of both property owners generate. At Vasakronan, there have been initiatives to measure the transport mode of choice of arriving employees at some of its facilities. Although no measurements have been taken regarding deliveries, the representatives agree that it is necessary considering the sustainability profile of the company. One exception is Nordstan, previously mentioned in the theoretical framework. Nordstan, being one of the largest shopping malls in Scandinavia, consists of both retail facilities as well office facilities. The mall has an underground freight street, where deliveries to almost all of the facilities of Nordstan are taking place. A study was conducted regarding the amount of freight vehicles arriving, the content of the loads as well as the vehicle utilization rate. Apart from this example, the companies state that more has to be done regarding the issue as well as its customers have to be involved as well. Realizing the footprint that their facilities generate is something that should be improved and the companies are optimistic regarding achieving success on that matter. They also suggest that the

amount of freight trips could be a criteria for the various environmental certifications that new buildings require today.

The representative from Castellum stated that “*we are seeing a trend among our tenants working in our facilities, that they (the employees of the tenants) desire other types of deliveries, their personal deliveries to our properties*”. This may be problematic the representative states, since it generates more vehicles arriving to its facilities and more people moving around in those facilities as well. However, the representative believed that instead of banning those kinds of deliveries altogether, they may be managed differently. Another clearly stated problem, outlined by Vasakronan was that although recognizing the potential role of the receptions for reducing the movement within the buildings, by receiving the parcel there, they are not being utilized. A property developer at Vasakronan stated that 9 out of 10 customers receive the parcels at the entrance to their respective offices around the various floors in the building.

Regarding the planning of new buildings, both representatives of Castellum and Vasakronan state that there are many aspects that have to be considered in order to make deliveries efficient, most of them are regulated. However, it depends largely on what kind of customers are expected to be located in that building. The space needs to be sufficient for delivery vehicles to be able to make various maneuvers. There are also various regulations in order to secure a properly working environment for the delivery personnel in terms of accessibility and adjustment of the loading bays. The representatives, not working with these kinds of questions directly, could only assume that all of the rules and guidelines at the *building permit stage* are being followed. However, there is an impression that, in general, questions related to freight deliveries have little recognition, focusing instead the efforts on offering as much space to the tenants as possible. Even at the city planning level, in the *detailed zoning plans*, city blocks are being designed, with very little space between the buildings, not recognizing the potential future flows of goods. From the point of view of the property owners, they believe that flow of goods, although being an important aspect, is still likely to be surpassed by the flow of employees in the building.

#### **4.4.2 Views on solutions**

Similarly to the interviews with drivers, operation managers at the logistics companies and the municipality representative, the representatives of Vasakronan and Castellum were asked to share their views on solutions regarding the Final 50 Feet issue found in the literature. In addition, the representatives also described other solutions that their respective company is either working on or is facilitating projects in.

##### *Coordinated procurement*

Coordinated procurement was perceived as an attractive option by both companies as they believed it could reduce the amount of freight vehicles to their buildings, improving the nearby environment of the facilities. The property owners acknowledged their responsibility for

facilitating these kinds of solutions and used the contracts with tenants in order to create various instructions for the tenants to follow regarding deliveries. Contracts are believed to have more importance as a tool for implementation of similar solutions in the future. Additional coordination is very rare apart from projects mentioned in section 4.4.3, according to both of the property owners. Coordination does exist in some form in the new buildings of one of the property owners, but it is also recognized that this solution is more feasible for larger tenants while smaller ones could perhaps use the system with small hubs and deliveries on smaller transport units such as cargo bikes. The size and the type of the business of the tenant is seen as an obstacle for coordinated purchasing as a solution by the property owners. However, the representatives also recognized that various solutions regarding coordinated procurement exist in other parts of Europe.

#### *Off-Peak Hour Deliveries*

The benefits of OPHD are clearly recognized by the property owners. Delivery times is an aspect which, according to the property owner representatives, has been discussed in the FQP Godsntätverket. As many infrastructure projects are taking place in Gothenburg at the moment, logistics providers experience difficulties in retaining its staff since those employees spend a lot of time in traffic, which is worsening their working environment. Logistics providers often deliver during normal working hours (office hours), forcing them to share the road with private car owners at a larger extent. Perhaps, the logistics providers should consider changing their way of executing delivery operations as well, one of the representatives stated. Vasakronan stated that they often offer key tags to the logistics providers already, in order to allow for unassisted OPHD, or give the opportunity to their tenants to offer their logistics providers an access to the building. In this sense, cooperation was seen as crucial by the property owners for implementation of these kinds of solutions and cooperation is something that they desire. The goal is again, to reduce the amount of freight movements in a city in order to make it more attractive. The representative of Castellum stated however, that this solution is perhaps more feasible and more desirable by retail locations, especially regarding deliveries during the night. A problematic aspect for night deliveries in Gothenburg is that many office and retail locations are in close proximity to residential facilities, potentially sensitive to the noise generated by deliveries.

#### *Centralized receiving stations*

Regarding centralized receiving stations as a potential solution, the opinions varied somewhat. The representatives of Vasakronan, participating in the interview stated that although it obviously depends on the existing design of the facility, a shared reception may be justifiable. However, when forwarding the question to a property developer at Vasakronan, via mail after the interview, the person stated that, although a reception is a vital function, there is a trend among tenants of receiving the parcels to the entrance of their office. This happens in 9 out of 10 cases which is why it is unattractive to use up space for a receiving station as opposed to leaving it for

the tenants to utilize in other ways. The representative of Castellum believed that the solution is relevant and could be a development of their existing concept of Coworking. The concept consists of a reception at each floor in the facility, working for the tenants at that floor level, receiving parcels and gathering collections among other tasks. This could, according to the representative, be done at the ground level instead, for all of the tenants in the building. Castellum currently works with *single* carrier lockers. The representative speculated that these two solutions could also be combined as a future model. As the volumes of parcels to the offices are expected to grow, the property owners will have to reconsider how to tackle that and what role they should have within this issue.

#### *Common carrier lockers*

While Castellum already works with carrier lockers, Vasakronan has a cautious approach regarding the solution, currently solely observing the development of the solution at other locations and companies. Castellum cooperates with a logistics provider regarding the carrier lockers for parcel delivery. The lockers may be utilized both by businesses as well as private residents. The logistics provider that Castellum cooperates with, in an independent transport company, only transporting its own parcels. A way forward, according to the representative of Castellum is to allow other logistics providers to use the common carrier lockers as well in order to truly gain the benefit from reduced freight trips to a facility which this solution inclines. The solution is also currently used by the tenants for receiving personal parcels, non-business related, potentially allowing for these kinds of deliveries instead of banning them as discussed earlier.

The reason why Vasakronan has not initiated a similar cooperation is due to participation of only one logistics provider. Representatives believe that without cooperation, the result would be an increase in the amount of freight trips to a facility which is undesirable. Since the facilities of Vasakronan are locked during the day, it would limit the ability for ordinary residents to utilize the lockers, which is part of the business idea of the mentioned logistics provider that Castellum cooperates with. Most of the logistics providers offer their individual solutions regarding lockers while a cooperation would be more beneficial in terms of reducing externalities such as amount of freight trips, congestion around the facility as well as movement within it. Cooperation models are desired by the property owners while each of the logistics providers are reinventing the wheel instead, hoping to increase their market shares.

#### *Intelligent Transport Systems*

When discussing the ITS as a potential solution for the Final 50 Feet issue, the solution not truly being connected to the property owners, the answers obtained during the interview were highly speculative, although optimistic. The representatives suggested using geofencing for controlling the entrance of freight vehicles in the city, for instance according to predefined time restrictions as a way of reducing freight traffic in the city. The Castellum representative raised an important point that the property owner does not really control how the goods are arriving to a facility since

the process is facilitated by the tenants. ITS solutions will be of more importance if the property owners would gain more control in facilitation of that process, becoming able to work with slot times and delivery times more clearly. All in all, making facilities, and its delivery operations more intelligent is an area of many opportunities for improvements.

#### **4.4.3 Description of other solutions**

The property owners Castellum and Vasakronan are already working with parcel deliveries to their facilities as the number of parcels has been increasing over the years. During the interviews, the companies presented some of the solutions that they have been implementing regarding the Final 50 Feet deliveries. The representatives of Vasakronan have described a project called *Älskade Stad* (The beloved city), firstly initiated in Stockholm. Fundamentally, the project is a cooperation between Vasakronan as a property owner, a logistics provider, a waste management company and the municipality of Stockholm. The waste management company Ragn Sells saw a challenge in how to develop its customer offer. Due to Vasakronan being a customer of Ragn Sells for many years, the staff of the waste management company was always present at some of the facilities of Vasakronan in Stockholm. It was realized that since the staff of Ragn Sells operated waste management facilities at the properties of Vasakronan daily, they could also distribute inbound and outbound parcels. A cooperation was initiated with Bring, another of the four biggest logistics providers in Sweden.

A special vehicle was developed for Ragn Sells containing both space for waste and parcels. The parcels are delivered by Bring to a small hub in the central city. Ragn Sells loads the parcels onto its specialized vehicles and distributes the parcels while also performing waste management activities. The parcels are being distributed by the waste management staff inside the building, all the way to the actual receiver of the parcel in the various businesses in the facility. Currently, the concept is in operation in an area in central Stockholm and has also reached its way to the third biggest city in Sweden, Malmö. At some facilities of Vasakronan, Ragn Sells also manages waste management and parcel distribution in buildings adjacent to Vasakronans property. The gains of the cooperation are reduced amount for freight trips to the buildings, reduction of noise, traffic and improvements in environment around Vasakronan facilities.

The limitation with *Älskade Stad* is that although the cooperation brings several stakeholders, operating in its independent systems together, the cooperation needs to be broader, across more representatives in each stakeholder category, the representatives state. These kinds of projects may also have other forms of obstacles. When the project *Älskade Stad* was initiated in Uppsala, another large city in Sweden, it failed since the city had a contract for waste disposal with another company, other than Ragn Sells participating in this project in Stockholm. The strength of the cooperation is that Vasakronan as a property owner, may induce contracts forcing the tenants to use Bring together with Ragn Sells for deliveries of their parcels, thus reducing the number of deliveries to the buildings as parcels are consolidated requiring only one vehicle for

the delivery. However, the gains would be enhanced if other logistics providers would become a part of this cooperation, the representatives state. Castellum is observing the concept of *Äskade Stad* as the company is interested. Its representative stated that the company is open for a collaboration as the concept is perceived as a win-win situation for the property owner. As stated previously, broader corporations are required in issues related to Final 50 Feet of urban distribution which is why competition between the property owners is perceived as less important in this case.

Castellum, as previously described, has implemented the utilization of carrier lockers in its facilities in cooperation with another logistics provider. The company is also a part of another project called SMOOTH, operating in Nordstan where Castellum has a number of tenants. The goal of the project is to reduce the number of logistics providers arriving at Nordstan, to its freight street. In order to achieve this, a new distribution process was implemented. Goods bound for Nordstan are being redirected to a care of address of a logistics provider with facilities in the outskirts of the city. When the goods are consolidated, they are being delivered by one transport unit directly to the freight street of Nordstan. As these types of schemes often require extra handling of goods with an additional lead time to the receiver, this aspect was examined by the property owner. However, the representative of Castellum stated that the increase in lead time was minimal. The logistics provider used in the frame of SMOOTH also performs the collection of goods. Tenants are not forced to use this scheme. According to the Castellum representative, almost all of the tenants agreed to participate.

Finally, representatives of both property companies state that in order for these types of solutions as well as most of the other potential solutions for deliveries and related Final 50 Feet issues to work, cooperation is required. The collective of property owners is divided, although there are examples of cooperation. In some cases, the property owners are the ones making the investments which may be feasible but it is also important to include the principals. Broader cooperation, by including more logistics providers is desirable in order to enhance the positive outcomes of these schemes both for the facility but also for the city as a whole. It might involve incentives for the logistics providers but the providers could be governed as well. The property owners could have a more active role in the development of the city environment as the necessity of it is being increasingly realized over time, the representatives state. They further explained that it may be tough to adjust the existing facilities but the aspect of logistics has to gain more importance when planning and designing new buildings.

## **4.5 Receivers**

Ten various companies operating in larger multi-tenant multistory buildings have been contacted regarding a potential participation in the role of a receiver of parcels and other goods. Two of those chose to participate. The companies were chosen on the type of premises they were operating from. One of the companies participated in a telephone interview as well as provided



the answers for the MAMCA part of the interview via email. The other company chose to provide their answers in an asynchronous interview via email.

One of the companies, further on called Receiving Company A, stated that they perceived the deliveries to their premises working smoothly as long as the volume of the inbound goods was small since the elevator present, has capacity of only one pallet. The company has a vague understanding of the amount of deliveries arriving to their premises stating that on average, they receive parcels every other day. In addition, they receive two pallets of goods each month. The number of obstacles for deliveries is limited which the Receiver Company A believes to be contributed by their low volume of receiving goods. However, an operational limitation is that the company is required by its property owner to receive goods through the garage resulting in its forcing the company staff to travel down the building in order to receive goods. Finally, all of the employees are able to order parcels and other goods without limitation nor coordination. An applied guideline by the company is to keep the stocks of goods low.

The second company, the trade organization The West Sweden Chamber of Commerce stated that one of the most challenging aspects for it, regarding deliveries, is the lack of space in the building. As the representative put it *“there is not a single extra square meter which could be used for warehousing. Our facility is very space efficient”*. Consequently, the arriving goods have to be handled as they are being offloaded from the delivery vehicle. If the goods are dropped in the only common area designated for freight deliveries, these would block the whole area for other deliveries as the area is very small. The delivery process functions reasonably well if the amount of goods is low, one parcel for example. As the volume exceeds that, the goods are often being delivered on pallets or trolleys which is problematic in the particular building that the organization operates within. The back entrance of the building has a different ground level compared to the building, which is why a ramp has been installed in order for delivery personnel to lift the goods up to the ground level of the building where the goods elevators are located. Considering this, The West Sweden Chamber of Commerce perceives the building not being optimal for deliveries.

The lack of space and the presence of a ramp are perceived to be the biggest obstacles for efficient goods handling in the building. The process of utilizing the ramp for the delivery is rather inefficient. Representative states that although the ramp has been updated with additional security features, the whole solution feels quite forced, as if the deliveries to the building were forgotten in the design phase of the building until a much later stage. All of the potential space in and around the building has been utilized, the building is space efficient but there is no space for improving the delivery operations. No exact number on the amount of freight trips or deliveries has been presented by the company. The representative estimated that The West Sweden Chamber of Commerce receives about a parcel each day with exceptions for occasions when

pallets or other larger shipments arrive. Personal deliveries occur at the office very rarely and are not perceived as a problem.

A positive aspect of the delivery process in the building which was outlined by the organization representative is the ability to grant access for the delivery personnel via telephone, instead of using the intercom. This is valuable, since there are no personnel receiving goods in the building, forcing each tenant to grant access for each driver of their deliveries. Although being perceived as a positive solution, there are privacy and security issues to it. The phone at the back entrance used by the drivers is connected to a staff member at each tenant, meaning that the staff member can be reached by it outside office hours. In addition, currently, there is no way of examining the person requesting access as the back entrance door usually is being opened by the staff after the driver has presented the company which he or she represents. Potentially, anyone could enter the building this way.

When it comes to the roles of the various stakeholders linked to the deliveries to office buildings, the representative of The West Sweden Chamber of Commerce outlines that the logistics provider representatives may sometimes be somewhat impatient. Partly, the reason being the design of the back entrance of the building, requiring the driver to use the phone located at that entrance in order to reach a tenant. There have been cases when the parcels were sent to a pickup point, although the company representative being present at the office, ready for receiving the parcel. Acquiring receiving staff for the building could have been an improvement, the representative speculated. In terms of the inefficient ramp, as the infrastructure has been put in place, the possibilities for alterations are few. In this case, it is clear that the deliveries should have been considered earlier, according to the respondent. The property of which The West Sweden Chamber of Commerce operates in had been sold since its construction in 2016 according to the representative.

Currently, there are meetings being held for all of the tenants operating in the building. However, the question of potentially coordinated procurement nor other delivery issues or solutions have been discussed. The representative speculated that partly, it has to do with the tenants all having different providers of goods and services as well as different demands. Some of the tenants, the neighbors, do not generate many freight trips at all according to the representative. The representative states that The West Sweden Chamber of Commerce has a positive mindset to implement these kinds of changes.

## 5. Analysis

*In this chapter the research questions will be answered by combining the views of the different stakeholders in the empirical collection to the theoretical framework. In section 5.1 the first research question will be answered, section 5.2 will answer the second question and in section 5.3 a discussion regarding what is needed for implementation of these solutions will be held.*

### 5.1 What problems exist

This section will answer the first research question, repeated below:

- What problems exist in Gothenburg for efficient Final 50 Feet of urban goods distribution from different stakeholder perspectives?

There is a discrepancy between drivers and the management at logistics provider companies regarding the view on how efficient the delivery operations are. The drivers have a lot of knowledge regarding the operational difficulties regarding deliveries in the buildings. The management on the other hand is not aware of some of the operational difficulties in multi-tenant multistory buildings and deliveries in general. The knowledge about these stays with the drivers, perhaps due to lack of communication channels. Three out of the four interviewed drivers stated that the possibilities of sharing and affecting their daily working environment are limited. The views on the potential delivery related problems are diverse between the drivers and the management, with the information obtained by the drivers in general not becoming utilized. The status quo for some of the operation difficulties prevails, potentially resulting in frustration and might be one of the factors facilitating high turnover rate of the drivers. A high turnover of the drivers is a problem which has been stated by the drivers themselves, with the drivers working more than five years being perceived as veterans. During the few occasions when the insights regarding operation inefficiencies in buildings and other infrastructure linked to the distribution process are shared with the management, such as traffic and loading zones, the management states its own inability to change anything.

In addition, information regarding traffic changes in the city, which is often being provided to the operational managers at the logistics companies seem to rarely reach the drivers, although they are being directly affected by the potential detours and increasing traffic queues. The necessary information for drivers' working tasks seems to be halting, before reaching them. Simultaneously, the drivers are being the best source for gaining the insights on how these traffic changes are affecting their work, for instance updated information regarding how much time is required to complete a route with these changes. In terms of operational problems regarding deliveries to the buildings, there is a big discrepancy between each building's ability to receive goods, with substantial differences in the delivery practices and time required for completing the delivery. A number of buildings visited during the observations of the drivers by the researchers

proved to lack sufficient infrastructure in terms of elevators and ramps, making deliveries of several packages on trolleys unnecessarily tough. Dragging the trolleys on staircases is physically demanding and dangerous since many heavy lifts are involved in the process. This is perceived as one of the aspects of the job contributing to the poor working environment. Similar to what is stated in the article by (Allen et al., 2018), a substantial amount of total time on route, the driver delivers on foot.

The market of logistics services in Sweden and Gothenburg seems to have similarities to the one in the UK and London (Allen et al., 2018). This was outlined by the operational managers stating that the number of logistics companies is high while the utilization factor in the vehicles varies significantly, similar to what has been stated by (Behrends, 2019). Due to fierce competition, customer satisfaction becomes an even more important factor facilitating renewal of the business. The minimum requirements for the service provided by the drivers is quite high while the understanding of the profession by the customers and ordinary citizens seems to be limited. The business climate is rather harsh, potentially forcing distribution companies to take risks and go the extra mile in ensuring customer satisfaction. Working environment is stated to be an important factor by the operations managers, while admitting that there is room for improvements. The harsh climate potentially translates into a worsening working environment for the drivers. In addition, there is a common belief in the society, mentioned by one of the operational managers that driving as a profession will soon go extinct altogether. This is far from the reality, at least for the parcel sector with a major part of the delivery being done on foot and providing high levels of customer service.

As the property owner collective is somewhat divided, the sustainability issues regarding properties are perceived differently. In general, a short sightedness exists when developing buildings with the logistics solutions not being prioritized or even considered until later as with the case of the building from which The West Sweden Chamber of Commerce operates. A number of constructions of multi-tenant multistory are being executed with the goal of obtaining profit as soon as possible. The property companies interviewed in the frame of this research acknowledge their role in the society as a facilitator of creation of attractive city centers. Managing the deliveries to their premises is perceived as a way of improving the environment in proximity to their facilities. They seem to be the drivers of the process of giving deliveries to multi-tenant multistory buildings more attention, considering the projects that they facilitate and participate in, such as Älskade Stad. Property owners could thus be claimed to have an understanding that their facilities are being large freight traffic generators as proposed by Jaller et al. (2015), although the issue is not being measured apart from a few exceptions, such as Nordstan. The lack of measurement is stated to be a failure since the issue has not found its way into sustainability considerations although having a potentially large effect on generation of negative externalities in the surrounding area of the buildings and the city. The need for change regarding the lack of measurements is recognized by the interviewed property owners, especially

considering positive outcomes in terms of increasing knowledge about the deliveries when such measurement was done in Nordstan.

Examination regarding the building permits and the requirements put on property owners as stated by the Swedish national law of planning and construction could only be done on a limited scale. An interview with someone from the municipality's construction board has not been conducted and the respondents from the property owners were not directly involved in the process of applying for building permits. Both the property owners and the freight manager at the municipality believed that the laws and the guidelines regarding parking and mobility (Göteborgs Stad, 2018) were followed with ease as they were not aware of any problems with adhering to them.

The property owners often being facilitators of various projects, which partly could be explained by the contractual power that they have towards the tenants, have achieved cooperation across various stakeholders. As project Älskade Stad was described, it contains a waste management company, a logistics provider, the property owner initiating the project, the tenants and the municipality. As described by Behrends (2019), the cooperation evolved from waste management to incorporating deliveries. The project is conducted in Stockholm and Malmö, where attempts to set up an FQP similar to the Godsnätverket have been made without success. Despite the cooperation linked to Älskade Stad regarded as positive, it lacks additional cooperation by other representatives of other stakeholder groups together with their competitors. The benefits could be enhanced by participation of additional logistics providers, as the number of freight trips would be reduced even more. The logistics providers on the other hand, often offer their own solutions for improved service of parcel delivery, for instance providing their own independent solutions regarding carrier lockers. This forces the property owner to choose one logistics provider for that particular solution, while the other providers might still deliver to the same building, directly to the tenants, undermining the locker solution in the first place as the freight trip amount will not reach desirable reduction. Other property owners might choose not to engage in these types of projects at all for the same reasons, as was shown by the example of Vasakronan.

Freight questions in the Gothenburg municipality are quite dispersed with different sections and boards managing different parts with none of the representatives solely having ownership of the issue. The example being loading zones and vehicle restrictions being managed by the municipality, while the question of car ownership being a political one. Another limitation for the municipality is the requirement to treat all the parties equally, for instance making vehicle utilization measurements of the trucks entering the central city complicated. As indicated in the current transport strategy (Göteborg Stad, 2014), freight questions have had limited importance in the last couple of years, which is confirmed by the freight traffic manager of the municipality. Apart from the project Stadsleveransen, very little has happened regarding the issue which is odd

considering the amount of construction projects and traffic changes in the city, making them harder to execute. Perhaps, Stadsleveransen was conducted and is often referred to when discussing Final 50 Feet urban goods distribution in Gothenburg since it is a very visual solution, easy to comprehend. It seems to receive a lot of attention and publicity although not making economical and operational sense for some of the stakeholders involved. The freight manager has confirmed that the space in the previous transport strategy, provided to the representatives of the municipality involved in the freight issues, has been very limited. As a new transport strategy is on the way. The prospect is that freight movements will be more recognized in the new issue, considering the emergence of the projects such as KomFram mentioned previously (Göteborg Stad, 2017). The importance of the issues may also alter with emergence of new politicians running the municipality. Thus, it has become clear why so little has been published regarding issues related to Final 50 Feet of urban goods distribution in Gothenburg, which has encouraged the initiation of this research.

One of the property owners and one of the receivers have indicated that personal deliveries to the workplace, parcel deliveries to employees of the tenants do occur. Although the receiver stated that this happens quite rarely, the property owner stated that this is an ongoing trend amongst their tenants. The problem of personal deliveries which was noted by TfL as early as 2015 (Transport for London, 2015) seems to have found its way to Sweden as well. The property owner representative, mentioning this trend, was aware of the development in London, with property owners and tenants forbidding these kinds of deliveries altogether. However, the attitude was different regarding a similar ban here in Sweden for their customers. Instead, the belief is that the issue might be resolved by utilizing some of the area in the buildings for common carrier lockers, providing space for both personal and business parcels or providing space at the ground level for pick-up points.

Carrier locker solutions might, as mentioned, be limited to one logistics provider. The pick-up point has to contain parcels from all of the providers simultaneously in order to be efficient. Property owners are prepared to make these kinds of investments and sacrificing areas for these solutions while logistics providers are not keen on consolidating their volumes with their competitors, at least not voluntarily. Logistics providers perceive the meeting between their employees and the customers as an important tool for marketing and branding, which could partially explain their reluctance. The same goes for the hubs, which the property owners are inclined to work with, providing space in their facilities for consolidating and distributing goods on more environmental modes of transport in the central city, similar to what Behrends (2019) has proposed as well as the authorities in London (Transport for London, 2019a). Again, the logistics providers seem to only cooperate in these types of schemes only if they are being obligated to, as with the example of Stadsleveransen, although it highly depends on the company. One of the logistics providers interviewed stated that all of the solutions which are in need of subsidiaries are not sensible while the other stated that these solutions may be justifiable

considering their sustainability goals. Diversification of opinions may be based on the setup of the logistics providers company as well as personal beliefs of each operation management.

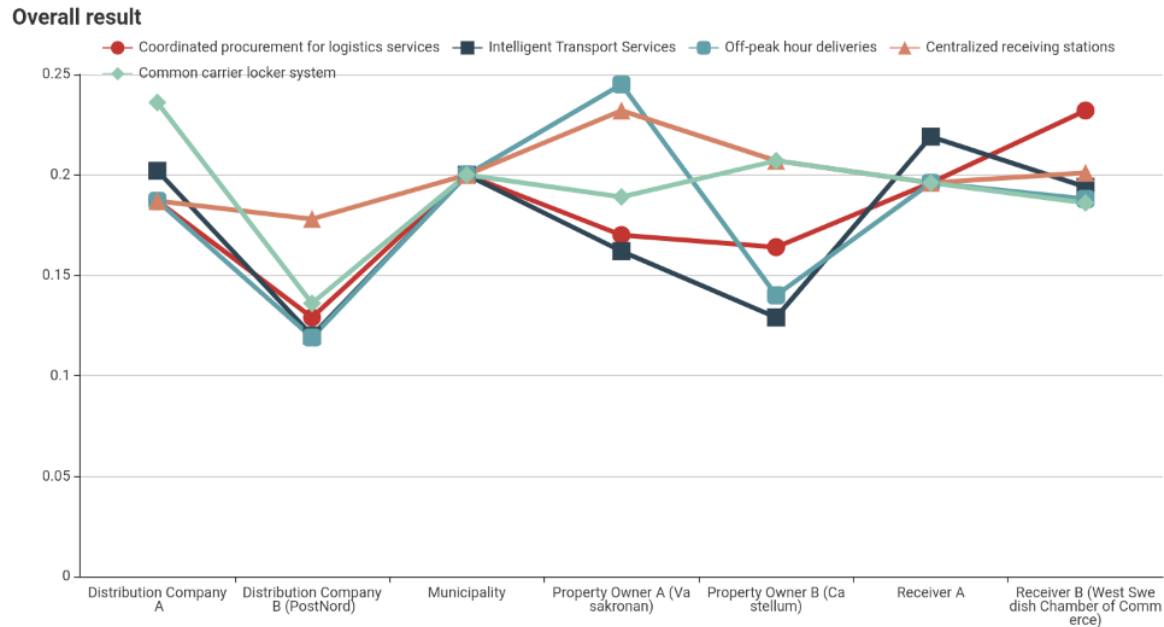
## 5.2 Solutions to the problems

The second research question is repeated here as this will be the focus in this section:

- Which solutions are perceived as feasible alternatives by the different stakeholders to the Final 50 Feet issues found in Gothenburg?

Below is a graph of how the respondents ranked the five solutions that were rated in the MAMCA tool. As Macharis et al. (2012) stated the highest scoring solution is not always the solution that should be implemented. This is also the case here as the freight traffic manager representing the municipality did not want to rank any of the solutions as the respondent felt there were too many variables to account for in order to give a definitive rank. Also as it was unfeasible to have the respondents gathered for a discussion regarding the criteria and solutions, the respondents might have interpreted the solutions differently than if they were gathered. An example of this are the distribution companies who ranked the working environment vastly different, even though they agreed that the working environment was the most important criteria. The difference came from the fact that the manager at PostNord acknowledged that the drivers working conditions are not at the level the manager would have wanted, thus giving it a smaller weight. There can be several other nuances such as this which has been missed.

In graph 1 the ranking of the solutions by the stakeholders can be seen. By visualizing the views of the stakeholders in a graph the differences between them can be more easily seen. Centralized receiving stations most stakeholders seem to regard as a feasible solution, other than that there are no other of the researched solutions which scored well with all stakeholders. The difference in outlook on the solutions between the different roles of stakeholders is expected as they have divergent objectives connected to deliveries in the city. The large gaps in the same role, as in the case of property owners and OPHD, is however more interesting why this view is so drastically different. In this case they had diverging views of the benefits of OPHD to the multi-tenant multistory building focused on in this thesis, with the characteristics more suitable towards retail according to Castellum.



Graph 1 - Ranking of solutions by the different stakeholders

### *Coordinated procurement*

The coordinated procurement as suggested by Behrends (2019) had mixed responses with only being the preferred solution by one receiver. The respondent from The West Sweden Chamber of Commerce was positive towards such a solution but stated the lack of cooperation between businesses and that it could be hard to implement practically. Since the distribution situation in the property was not something that was discussed in the house meetings, it signals that the situation is of low importance to the tenants. That the receivers were uninterested in how the distribution is done in the city is understandable but also regrettable as they create the demand, whilst suffering few of the consequences. Rather the industry is working to become even cheaper and faster to satisfy their needs.

The property owners ranked them in the middle but outlined their possibilities of using their contracts to enforce the use of a certain distribution solution. Both property owners had created solutions for their tenants to reduce the number of trips that their properties generated with Älskade Stad & SMOOTH. These projects might not be coordinated procurement in its purity, but rather a form of hub activity, but it signals the property owners willingness to work to reduce the amount of freight trips that their properties generate. It further confirms the contractual power that the property owners have, thus indicating the feasibility of them being one of the actors most likely to achieve change.

The distribution companies were somewhat reluctant to coordinated procurement as a solution. The manager at PostNord mentioned that it could lead to less stops which could be positive but if it was too consolidated it would be put on pallets which would lead to an increase in larger trucks



in the city. The manager at Distribution Company A pointed out that the sender is the party that orders the transport, making it only feasible to implement on a certain number of standardized products that most receivers in the building use. Thus, a hub solution as have been implemented by the property owners can reach a wider amount of transports, but does incur another handling point instead, making it a balancing act between the amount of freight trips and increased handling which potentially leads to higher costs and longer lead times. The coordination must also be done in the right part of the supply chain in order to not fill the cross docking terminals close to the city with office-supplies. Coordinated procurement is problematic to implement with many dispersed actors having to cooperate on several levels in order for it to work.

### *Intelligent Transport Services*

Among the different ITS solutions proposed by the City of Seattle Freight Master Plan (2016), most discussed during the interviews were route planning software and real-time updating of available loading zones. The ITS solutions were also the most unclear to the participating respondents, which is understandable as it mostly relates to the distribution companies and the other stakeholders lack a clear connection to these systems. Hence it was also drivers and the managers at the distribution companies who had most to contribute regarding these. Property owners discussed intelligent buildings and geofencing, but these solutions have some way to go until they are mature and can be used efficiently.

All the drivers stated that they would prefer doing their own route planning rather than having it being done by a computer as it would be too inflexible. Structuring their own route prepared them for the content of their day and if the ITS solution was not working optimally close 100% of the time, they would just fall back to doing it themselves due to frustration. During the observations the drivers did several changes to their route on the fly as a situation happened, showcasing the need for flexibility. The drivers also had to sometimes make illegal turns in order to meet their schedule, with a route planning software not taking this into account it could lower the efficiency of the drivers. It might be years until a route planning software is sophisticated enough to adapt in real-time to the flexible environment. Having the drivers plan their own route increases their ownership of their work, which the value of is hard to measure but surely is not insignificant.

Despite this, the manager at PostNord mentioned that they are developing real-time route planning software but admitted that it is far from being implemented into daily operations. The operational manager at Distribution Company A was sceptic towards route planning systems other than it opening up for someone other than the driver to stow the vehicle, making it possible to have the vehicle ready when the driver shows up in the morning. This was not seen as beneficial by the drivers as they wanted to know what they had in their vehicle and where in order to limit time spent searching when parked for delivery. This further signals the discrepancy between the drivers and management when it came to understanding of the drivers work

situation. Collecting and presenting data in real-time in a usable way that is needed for route planning is a costly endeavor. With freight being regarded as a budget service and with the drivers already doing the route planning in a sufficient way it is hard to see the benefits of investing in such a system.

Regarding updating the drivers with which loading zones are free in real-time, both the freight traffic manager at the municipality and the manager at PostNord mentioned the increased stress this could put on the drivers in an already stressful work environment. It was perceived as a better solution to have enough infrastructure in order to not force the drivers to chase free parking space. Showing an understanding of the work environment of the drivers and also that the municipality's way of not working with increased efficiency might be the better way for longevity. ITS is however not one solution and as the technological and practical possibilities increase it is possible that this area increases in importance.

#### *Off-Peak Hour Deliveries*

OPHD is also an alternative met with overall limited enthusiasm except from the property owner Vasakronan. In line with what was found by Sánchez-Díaz et al. (2017) they were more keen towards the unassisted deliveries due to the high costs associated with assisted. Castellum did not see the need for OPHD in office buildings, saying that this was more relevant for retail stores, as the goods can be delivered before the personnel arrives in the morning and they can start unpacking when arriving. These benefits are not as clear when talking about the deliveries that are usually done to tenants in the properties researched in this thesis. In Gothenburg, most districts are mixed between residential and businesses, meaning that the silent practices mentioned by Sánchez-Díaz et al. (2017) would be a necessity. As the proposed silent delivery practices could indeed reduce the noise level, it would most likely not eliminate it, thus solely replacing one negative external effect for another, limiting the benefits.

The manager at PostNord proposed that if OPHD would be implemented, the deliveries could start even earlier in the morning instead of during the night. There are benefits of moving the deliveries earlier rather than later. The freight manager from the municipality explained that with the current setup of distribution networks in Sweden, the goods enter Gothenburg during the night for sorting and delivering during the day. The distribution network of city logistics is connected to larger distribution chains and changing things on a city level must work in the larger picture too. As distribution terminals close to the city are cross-docking terminals, they don't have the space capacity to store the goods for a prolonged time. If done at night, the receivers need to accept an extra day of delivery with this setup, which is going against the direction of the market that is instead going towards instant deliveries, meaning that customer behavior would have to change.

Moving it to earlier in the morning instead would not have these problems. It would however require that there is enough time to get sorting done in time. This is outside the scope of this thesis and thus it cannot be said here if this is a possibility for the distribution chain.

The outlook on OPHD by the drivers was mixed, with some saying that they were open to work outside the normal business hours and others were skeptical towards the benefits. The reasoning here was that unless you get all receivers in an area to shift towards OPHD there would still need to be a vehicle doing the same route during the day, limiting the positive benefits of OPHD drastically. As the response from the tenants was not that enthusiastic, this is a possibility. In the article by Sánchez-Díaz et al. (2017) they motivated the behavior change of receiving at night with a monetary incentive for the receivers. Maybe if this were to be implemented in Gothenburg the municipality would have to incentivize the receivers in a similar way? In return, a large enough number of participants would be reached in order to truly reduce the amount of distribution vehicles during the day and achieve the desired outcome of evening out the use of the critical infrastructure - the road network. Perhaps, one of the reasons why OPHD has been unsuccessful in Gothenburg before is the lack of scale, which could potentially be provided with these kinds of incentives.

#### *Centralized receiving stations*

If there is one of the solutions that stood out as being met with positive response it is the centralized receiving stations. To have the responsibility of the distribution company end by delivering to the reception, a designated goods receiving station or by just leaving it in a closed room in close proximity to the entrance was something that most respondents could get behind. This leads to that the internal logistics of such a property is either handled by staff in the building (increased costs for the property owners) or that each receiver has to get their deliveries from this designated area (lower service for the receivers). The operational manager from Distribution Company A was a bit reluctant towards such a solution as their company model was providing premium service for a premium price. A centralized receiving station would undermine their possibility to differentiate their provided service. The meeting between the driver and the receiver was also outlined as important by both distribution managers, for marketing and service quality purposes. The drivers did agree that such a solution could make their work environment easier by limiting the time spent on foot, but it would also remove one of the best aspects of the job - meeting the customers. As the drivers spend a vast amount of their time alone in the vehicle during a work day, getting to socialize with the receivers is perceived as both a great service but also a necessary aspect in order to not just feel like a robot delivering parcels.

The centralized receiving stations as outlined in Jaller et al. (2015) does require space, something that is scarce in most properties in central cities. This can make it difficult to implement such a solution in buildings where the infrastructure is set. This was seen in the case of The West Sweden Chamber of Commerce, as it was not seen as possible to install such a solution as there

was no room to store goods that had been delivered. Still, the representative of The West Sweden Chamber of Commerce would like to see such a solution but did not see it as feasible in their current location. Thus centralized receiving stations is not something that is easily implemented in buildings that are already constructed but something to look into when developing new buildings.

#### *Common carrier locker systems*

An alternative to centralized receiving stations are the common carrier lockers that had been tested by Goodchild et al. (2019). Here, the problem is instead to go from single carrier lockers to common carrier lockers. Castellum had a cooperation with a distribution company and had a single carrier locker as this distribution company was the only actor that could deliver to it. This can lead to increased handling of the parcel if the distribution company only handles the last mile of the distribution chain while participation of only one distribution company limits the benefits, potentially increasing the number of freight trips if the other distribution companies are visiting the same premises in the same frequency as before.

Vasakronan had kept an eye on this implementation by Castellum as an interesting solution but had chosen not to implement it themselves due this single actor problem. They further indicated a frustration with distribution companies developing their own solutions to try to win market shares. They would rather see this last part of the distribution chain to not be about market shares. This is rather utopian as with free markets it is unlikely that companies would all stop competing and instead focus on bringing societal good, especially for national or global companies that are active in several markets.

During the observations it was found and confirmed by the drivers that most buildings could fit such lockers on the entry level. However, some of the drivers pointed out that these lockers could be an eyesore in contrast to the beautiful old architecture prevalent in Gothenburg which could make property owners hesitant to have them installed in some locations. This aspect was not mentioned by the property owners in the interviews but it cannot be disregarded as a factor that could hinder implementation as well.

There is also the problem of how to connect several distribution companies to the business system of the lockers so that they can see which lockers are empty, how long a parcel has been there and when the receiver picked up the parcel. This touches on another problem with the current way distribution is done with a signature for the parcel being required in most cases, if the receiver has not opted out willingly of requiring a signature. Finding a signee for a parcel was one of the most time consuming aspects (Goodchild et al., 2019) and could thus be reduced by limiting this practice. There is however the legal question of who is responsible for the parcel during the time it is inside the locker? This is something that CLOSER (CLOSER, nd-b) has

lifted as one of the limitations when researching the possibilities of implementing them here in Gothenburg.

#### *Solutions mentioned by the respondents*

Another possible solution outside the ones found in the literature that have surfaced during the empirical collection are *living streets*. These were requested by the manager from PostNord and were presented by the freight traffic manager as a good solution to the researched problem. With these living streets private cars are naturally limited as they avoid these streets due to the low speed and limited capacity, both of which were something that these two actors valued. These living streets also allow the distribution drivers to park right outside the building when delivering, lowering both the need for having loading zones and the distance that the drivers must walk when delivering.

Regarding loading zones many of them today are not only for trucks but can be used by private cars when loading and unloading for a shorter period of time. This makes it harder for traffic wardens to give parking tickets to cars abusing them. To combat this problem the freight traffic manager at the municipality suggested changing all loading zones to trucks only, making it easier to give owners of private cars tickets. The question is why this has not been done even though it was their suggestion and the freight traffic manager expressed that they had full ownership of the loading zones did not surface. It might be because it has follow up effects on the residents which would then have limited space to perform such activities. What follow up effects it would have for the citizens should be investigated before such a change is implemented.

As Allen et al. (2018) pointed out the parcel distribution industry is characterized by many players with poor vehicle utilization. The operational manager of Distribution Company A suggested that the municipality should limit the access to areas in the city for actors with low vehicle utilization in order to limit congestion and force actors to perform some kind of minimum level of business. The freight traffic manager at the municipality was clear that they had no mandate on the distribution companies utilization of their vehicles and could therefore not implement any such policies as the infrastructure should be free for all to use. The hope is here that the market removes unserious distribution companies which have lower wages and thus can afford having lower vehicle utilization.

When asked about the amount of deliveries that their properties generated, Vasakronan suggested that measurements of deliveries and the efficiency of the delivery process in the building should be part environmental certifications such as LEED. Having the deliveries become a part of the requirements might increase the knowledge of the footprint that logistics has and thus might lead to changes in behavior. As a starting project it might be interesting to measure the amount of deliveries that are done to different buildings in the city in order to grasp which buildings are LTGs. Neither property owners nor the municipality had any real figures of

the amount of deliveries that properties generated except for certain ones such as Nordstan, Volvo manufacturing plants and the port. The drivers which had their areas knew how often they delivered to a building but were unaware of the other distribution companies. The tenants knew what they generated but were unaware of such numbers for the building they were operating in. This falls in line with the discussion by Jaller et al. (2015) regarding the general perception of what generates freight trips and what does not, with ports being recognized as a LTG but multi-tenant office buildings are not.

### **5.3 What needs to be changed for implementation of solutions?**

In the previous chapter it has been shown that all the involved stakeholders in this thesis have something to gain from improving the delivery situation, so why has it not happened yet and what is needed for this to happen? The last step of the MAMCA procedure is implementation, the authors of this thesis do not have the mandate to implement any solutions but those can be discussed regarding how to proceed in order to reach a common ground where implementations can be operationalized.

Since city logistics is a complex field with many involved actors as stated by Cardenas et al. (2017) and confirmed by the respondents, it is hard to implement any changes alone as most changes have ripple effects outside their own organization. Dablanc et al. (2007) pointed to that there is a stalemate between the different actors in city logistics when it comes to doing changes to the operations as actors are unwilling to take risks and incur losses if competitors continue operating under status quo. Thus, the role that the stakeholders should have when going into the implementation stage should be clearly defined, as to not skew the market into a certain stakeholders favor.

The property owners and the municipality stated in their interviews that they saw themselves as having a responsibility for the continued development for the city. This feeling of responsibility was not as clear when it came to the distribution companies and the receivers. The distribution companies are fulfilling a demand and the receivers need their deliveries. The municipality and the property owners have a vision for how they see the future of Gothenburg and thus how distribution should be performed in order to have the vibrant and inclusive city center as stated in the transport strategy (Göteborgs Stad, 2014). With the new transport strategy planned for Gothenburg, hopefully, the way of how city logistics are performed increases in importance and more people outside the field of logistics will see its importance to achieve the city that they desire.

Solving the problems on the micro level of the Final 50 Feet can have beneficial effects that reach outside the Final 50 Feet as improving operations here can ease congestion and decrease other negative external effects from urban logistics. No solution can be implemented in isolation as seen both in the city logistics literature and the empirical material points to that there are

several variables and actors that have to be aligned in order for an implementation to be successful. Thus, cooperation between the actor groups is necessary in order for a common ground to be found and for any changes to the system that the Final 50 Feet is connected to, to be successful. Both property owners Vasakronan and Castellum have ongoing cooperation with distribution companies in order to facilitate more efficient distribution solutions for their tenants, as well as cooperating with other property owners (Älskade Stad, SMOOTH & the single carrier locker-project). All stakeholders have put forward that they are willing to cooperate in some magnitude in order to do some societal good but of course there has to be some benefit for the involved actors for doing any such cooperation.

The distribution key mentioned by the freight manager at the municipality can be seen as more than just the business criteria. It is also an indication how much benefit it gives an actor together with how much costs they are willing to take for this benefit. The benefit may exceed more efficient operations, increased revenue or market share. As was seen in the case of the freight manager and the property owners, they are willing to try implementations that might not make business sense, but as they see themselves as having a responsibility for the development of the city for its residents, it did make sense. The example with the construction site and the distribution companies is also an example of a distribution key where both parties are winners, the distribution companies don't have to search for each subcontractor on a dangerous construction site, saving time and money. The people responsible for the safety of the construction site also limit the amount of people wandering around and they are able to collect all deliveries to one location, ensuring that nothing gets lost. When performing any implementations, this distribution key should be investigated for all parties in order to find out how much costs a party is willing to bear for the benefit it brings them. If there is still a mismatch between the benefits and costs for the involved stakeholders, then perhaps the municipality must bear the extra costs and use subsidies or any other form of motivation to ensure that the other stakeholders distribution keys are positive. This of course implies that the benefits are great enough and fall in line with the goals of the municipality. As the municipality has stated in their transport plan to work for having a vibrant city center attractive to both residents and businesses, it is feasible for this party to take the extra costs to strive for that vision.

As many of the solutions take away the differentiation possibilities for the distribution companies of their service due to increased cooperation with their competitors, it is an important factor to keep this in mind when choosing possible solutions. In order to motivate them to give up this differentiation possibility, they must receive some other benefit in return, in order to perceive themselves as a winner as well. Yet, they are not alone in this, all stakeholders must be winners of the distribution key in order to have a successful implementation of a solution in the long term. As the distribution keys for all stakeholders are different, successful implementation is possible but requires extensive knowledge of the different stakeholders' situations. The municipality, which could be argued sits on the bigger responsibility of ensuring a healthy

vibrant city center, is lacking when it comes to knowledge of the freight according to the freight traffic manager. It has also been rather passive when it comes to working with freight related questions in the last years. Hopefully, the new freight traffic plan helps with increasing the understanding of the importance of freight and a more general understanding of the situation in order to be able to suggest and implement solutions that motivate all stakeholders.

All the respondents that were a part of the FQP network were positive towards the meetings and raised them as a great discussion board to talk about collective freight issues rather than individual ones, as the operation manager in Distribution Company A explained. This is in line with what has been found in the literature regarding these meetings that they are a great place to connect the different stakeholders (Lindholm, 2014). None of the respondents could mention any specific solutions that have emerged from these meetings although they are supposed to be solution oriented. However, perhaps the greatest benefit that should not be overlooked is that this is a place where all stakeholders can express their views to stakeholders outside their own industry. Having such a large variety of top executives and other decision makers present together with politicians solidifies that these discussions are made between parties that have the mandate to implement changes they see as necessary. In order to grasp what aspects are part of the other stakeholders distribution keys, these meetings could be seen as drastically increasing the understanding of the motivations for other stakeholders.

This understanding may be enhanced by including more representatives of each stakeholder group, such as for example more logistics providers. Partly, this is necessary as the representatives of this stakeholder operate in a very tough business environment with a lot of competition and are not likely to cooperate with other logistics providers. In addition, as the logistics providers are keen on offering their own individual solution such as single carrier lockers, an FQP cooperation might change that, as the point of view of other stakeholders may reach more of the logistics providers, forcing them to cooperate in order to find better solutions. An enhanced FQP may also improve the situation for the drivers, provided that the communication channel between them and their operation management is improved. This would facilitate the drivers working related problems regarding poorly adjusted buildings to reach other stakeholders, increase understanding of the Final 50 Feet issues prevailing and to act on those since currently, very little seems to be exchanged regarding the infrastructure between the stakeholders.



## 6. Conclusions

To conclude, there are a variety of different solutions that mitigates the problems related to the Final 50 Feet of urban goods distribution by reducing the truck dwelling time and the amount of failed first deliveries. Not all solutions are feasible to implement in all situations. Some of the solutions incur changes to the behavior of the receivers when it comes to the service they expect and limit the service that distribution companies can provide. These changes go against the grain of where the market for deliveries is going. As solutions have reached different levels of maturity, which solutions that are feasible to implement can also change as the market develops. A single solution cannot be used to fix all problems, but rather they have their advantages and disadvantages and these should be evaluated as alternatives to business as usual if the situation of the Final 50 Feet is to be improved on in Gothenburg.

The researched problem has several groups of stakeholders with different goals and value structures, different road networks, different solutions and other variables that increase the complexity of the problem. To ensure that no stakeholder group is left behind or that unforeseen effects arise communication between the stakeholders is adamant. The FQP meetings have the mandate by including top policy makers in the different stakeholder groups to implement changes. These meetings are also viewed positively by all respondents in this thesis that attended them. These meetings are therefore an excellent platform to continue the dialogue of how these different actors want distribution to function in Gothenburg going forward and increase the understanding of the different stakeholders criteria and their distribution key.

The municipality and the property owners were the stakeholders that saw themselves as responsible for the development of the inner city. There is a stalemate situation in Gothenburg regarding the distribution situation with few larger changes happening outside of Stadsleveransen. As the municipality has stated in their transport strategy that they want to work for a vibrant city center they should be the stakeholder that breaks the stalemate and initiates the changes they want to see for this to become a reality. Since the consumers of the transportation services do not realize their impact in terms of negative externalities generated by the behavior, the changes must come from the stakeholders that are aware of those and have an explicit goal of improving the situation which is why the role of the municipality is being emphasized.

The MAMCA although not providing a definitive answer to which solution should be implemented, has helped tremendously with framing the problem and gathering the viewpoints of the different stakeholders. The findings in this thesis have provided insights into the vast discrepancy between what the stakeholders connected to deliveries in Gothenburg see the situation as and how they reflect regarding possible solutions. This knowledge can be of help when deciding a way forward in Gothenburg and how to motivate stakeholders to take part in a possible solution. The thesis has also contributed with much needed knowledge to the underdeveloped field of the Final 50 Feet of urban goods distribution. This by looking at the situation in a city which has not been researched from this perspective before and by studying the

stakeholders of the Final 50 Feet in a MAMCA setting, something which has not been done previously.

## 6.1 Future research

Further development of this research would primarily be benefited by involvement of stakeholders participating in the planning, design and construction stage of a building. After a building is completed, the infrastructure which a building represents is hard to alter. Thus, this stage requires more investigation considering the statements made by the interviewees in the frame of this thesis regarding short-sidedness of construction projects and a number of multi-tenant multistory buildings being far from ideal in terms of delivery receiving practices. In order for a building to have efficient delivery receiving practices, these have to be considered early on in the process in order to avoid having to implement semi-efficient solutions to a facility with no extra space for those, potentially worsening a buildings capacity to receive goods and consequently worsening the working environment of the delivery personnel. As a suggestion, the stakeholders to be included for further research on the matter of the Final 50 Feet in urban goods distribution in the context of Gothenburg are: the municipality city planning board (*Stadsbyggnadskontoret*), construction companies and architect bureaus in order to get their insight on what problems exist in the planning stage and what are the potential solutions.

Another interesting aspect to investigate, which has emerged throughout development of this research is each stakeholders' perceived role in the development of a city and contribution to solutions improving the attractiveness of the city. Clearly, the opinions of the stakeholders differ on the matter. The costs that the property owners involved in this research are willing to take in order to improve the attractiveness of a city center are not corresponding to the other stakeholders. In addition, as the collective of the property owners is divided according to the representatives of this stakeholder, the research would be flourished by involvement of more property owning companies. The reasons for varying desire for taking on costs might have its source in the goal of the property owners of their facilities being coveted which implies having attractive surroundings while this is not as important for other stakeholders, perhaps apart from the municipality. Nevertheless, it could potentially become a future contribution to the fresh subject of the Final 50 Feet of urban goods distribution.

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## **Appendix 1 - Questionnaire to drivers**

- Please explain what your work is and what activities you perform
- How would you say you spend your time between the different activities you mentioned
- What are the biggest general issues you meet in your work?
- What are the biggest issues related to deliveries to multi-tenant office buildings?
- What would make your work easier/safer/faster to perform?
- Ask them about their view on the solutions we have found in theory
- What do they think about the role of the municipality/receivers/3PL companies?
- Do you think that your management is aware of these problems? What kind of possibilities do you have to raise attention about a certain delivery related issue?



## Appendix 2 - Questionnaire to 3PL company

- State the problems and alternatives we have found, ask if there are anything we have missed
- Go through the criteria tree we have assigned the role and make sure we are on the same page
- When the criteria tree is set, ask them to weight the criterion by dividing 100 points between the criterion
- Ask them to do a pairwise comparison between the different alternatives based on how effective or easy a solution would be to implement

MAMCA part done, rest of interview was a more open discussion with these questions as a base

- What are the major challenges to delivering in a city context?
- What are the biggest issues related to deliveries to multi-tenant office buildings? Any other buildings or receivers that are problematic?
- What kind of responsibility do the receivers have in terms of the ability of receiving goods efficiently? Are there ways for you to effect that?
- FQPs, how valuable do you think those meetings are? Do they contribute to any changes in policy?
- What is your view on consolidation of freight in the inner city resulting in reduction of your presence? How much do you value the marketing done by your vehicles in the inner city?
- How important is it that the drivers are meeting the customers on a daily basis?
- What do they think about the role of the municipality/receivers/3PL companies?
- Who has the decision power in regard to route planning?
- What changes would you have liked the municipality to do differently?

### **Appendix 3 - Questionnaire to municipality**

- State the problems and alternatives we have found, ask if there are anything we have missed
- Go through the criteria tree we have assigned the role and make sure we are on the same page
- When the criteria tree is set, ask them to weight the criterion by dividing 100 points between the criterion
- Ask them to do a pairwise comparison between the different alternatives based on how effective or easy a solution would be to implement

MAMCA part done, rest of interview was a more open discussion with these questions as a base

- What are the biggest general challenges to city freight and deliveries?
- How do you perceive the balance between the reduction in utilisation of personal car and potential increase in freight movements, as more supply will become localized?
- Is internal delivery operations in buildings something which has been discussed in the context of freight transportation in Gothenburg? Do you believe that there are problems regarding this aspect in Gothenburg?
- FQP, how valuable do you think these meetings are? Do you have continuous work with evaluating the performance of freight transport in Gothenburg? Would you have preferred meetings more often?
- What do they think about the role of the receivers/3PL companies?
- What do you see as your role in promoting the possibility of efficient transport and deliveries in the city of Gothenburg?
- A year ago, there was a meeting initiated by the freight transportation sector in order to discuss the traffic situation in Gothenburg. How is the dialogue initiated otherwise? Does it happen on a routine basis?

## Appendix 4 - Questionnaire to receivers

- State the problems and alternatives we have found, ask if there are anything we have missed
- Go through the criteria tree we have assigned the role and make sure we are on the same page
- When the criteria tree is set, ask them to weight the criterion by dividing 100 points between the criterion
- Ask them to do a pairwise comparison between the different alternatives based on how effective or easy a solution would be to implement

MAMCA part done, rest of interview was a more open discussion with these questions as a base

- Is freight something that is looked at problematically from your end? Or is it just a means to an end?
- How much do you think that this business generates in terms of freight volumes and freight trips?
- What are the biggest issues related to deliveries to your facility?
- What do you think would make your receiving operations more efficient?
- What do they think about the role of the municipality/receivers/3PL companies?
- How is your procurement being carried out? Is there one or several employees being able to order parcels?
- Is there any procurement policy in place?
- Do you see yourself as having any responsibility for the amount of deliveries contributing to congestion in city centers or is it up to the delivery companies to fix? Would you be willing to change your ordering behavior to contribute to a solution?

## Appendix 5 - Questionnaire to property owners

- State the problems and alternatives we have found, ask if there are anything we have missed
- Go through the criteria tree we have assigned the role and make sure we are on the same page
- When the criteria tree is set, ask them to weight the criterion by dividing 100 points between the criterion
- Ask them to do a pairwise comparison between the different alternatives based on how effective or easy a solution would be to implement

MAMCA part done, rest of interview was a more open discussion with these questions as a base

- How do you look at freight from your perspective?
- How much do you think that your facilities generates in terms of freight volumes and freight trips?
- What do they think about the role of the municipality/receivers/3PL companies?
- Do you see yourself as having any responsibility for the amount of deliveries contributing to congestion in city centers or is it up to the delivery companies to fix? Would you be willing to do investments in order to contribute to a solution?
- Do you promote any procurement policies for the tenants in your buildings?
- How easy is it to follow the municipalities guidelines when adjusting the building for deliveries?
- How much do you consider the ease of deliveries when designing new buildings?
- Would you want to be included in a dialogue regarding city freight? In the case of Vasakronan, how valuable are the Godsnätverket meetings? Do you have examples of what these meeting have generated from your perspective as a property owner?

## Appendix 6 - Criteria tree with weights for the stakeholders

