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Managing freight transport as a city

– Decreasing climate change impact and
reaching sustainable mobility

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Managing freight as a city – decreasing climate change impact and reaching sustainable mobility

Att hantera godstransporter som stad – minska klimatpåverkan och nå hållbar mobilitet

Keywords: Freight transport management, climate change, sustainable mobility paradigm, city.

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Abstract

Climate change impose a major challenge to the world. About 23% of the world's energy-related CO₂ emissions derive from transportation. Urban freight transport has been increasing because of a growing demand for goods. Cities need to manage freight transportation to decrease its climate change impact. The purpose of this study is to investigate what the cities Gothenburg, Copenhagen, and Turku need in order to manage urban freight transport and what measures the cities have adapted to reduce the CO₂ emissions deriving from urban freight transport. The study aims to reflect upon how the elements included in the practice of municipal freight transport management relate to the sustainable mobility paradigm and identify measures to decrease climate change impact and reach sustainable mobility.

Social practice theory guided the analysis, where meanings, materials, and competences was searched for in the empirical material. Data was collected through a document analysis and interviews with employees at the cities' administrations. The results showed that the reasons for managing freight is to reduce environmental and negative social impacts, ensure good ease of passage for freight transportation, strengthen the economy and create jobs, and avoid conflicting goals and find joint solutions. Needed materials are funding, guidelines, and personnel resources. Needed competences include taking a systems perspective, understanding the private sector, engaging in cooperation, seeking and managing funding, transport planning, and procurement and planning of the own municipal freight transportation. The need and behaviour that steers the freight transportation seem to be excluded from the freight transport management practice. This is the need for goods and its connected consumption behaviour. The cities' adapted measures to reduce the climate change impact from freight transportation focus on technological and logistical improvements. The freight transport management practice includes features that are in line with the sustainable mobility paradigm as well as features that are not. To strengthen sustainable mobility, the inclusion of stakeholders when managing freight transport could be expanded to inhabitants and persons with competence in environmental and social aspects.

Keywords: Freight transport, freight transport management, climate change, sustainable mobility paradigm, city, municipality, local level, Gothenburg, Copenhagen, Turku.

Sammandrag

Klimatförändringar innebär en stor utmaning för världen. Ungefär 23% av världens energirelaterade CO₂-utsläpp härstammar från transportsektorn. Urbana godstransporter fortsätter öka som ett resultat av en ökande efterfrågan på varor. Städer behöver hantera godstransportflöden för att minska klimatpåverkan från dem. Syftet med denna studie är att undersöka vad städerna Göteborg, Köpenhamn och Åbo behöver för att hantera godstransporter och vilka åtgärder de har antagit för att minska CO₂-utsläppen från dem. Studiens mål är att reflektera kring hur elementen i den kommunala godstransportshanteringspraktiken förhåller sig till det hållbara mobilitetsparadigmet och identifiera möjliga åtgärder för att minska klimatpåverkan och nå hållbar mobilitet.

Social praktikteori guideade analysen där betydelse, material och kompetenser identifierades från det empiriska materialet. Data insamlades genom dokumentanalys samt genom intervjuer med anställda vid städerna. Resultatet visar att anledningarna till att hantera godstransporter är att minska miljöpåverkan, minska negativ social påverkan, säkerställa god framkomlighet för godstransporterna, stärka ekonomin och skapa jobb samt undvika målkonflikter och hitta gemensamma lösningar. Material som behövs inkluderar finansiering, riktlinjer samt personella resurser. Kompetenser som behövs är systemperspektiv, förståelse för den privata sektorn, söka och hantera finansiering, samarbetsförmåga, transportplanering samt upphandling och planering av stadens egna interna godstransporter. Behovet och beteendet som styr godstransporterna verkar vara exkluderat från praktiken. Detta är behovet av varor samt konsumtionsbeteendet som är kopplat till det. Åtgärderna som städerna har antagit för att minska klimatpåverkan från godstransporter fokuserar på tekniska och logistiska lösningar. Själva praktiken innehåller både drag som är i linje med det hållbara mobilitetsparadigmet och drag som inte är det. Den hållbara mobiliteten skulle stärkas ifall deltagandet breddas så att privatpersoner och personer med kompetens inom miljö och sociala aspekter också inkluderas i godstransporthanteringen.

Nyckelord: Godstransport, godshantering, klimatpåverkan, hållbara mobilitetsparadigmet, stad, kommun, lokal nivå, Göteborg, Köpenhamn, Åbo.

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1. Introduction

Climate change and emissions of greenhouse gases (GHG) impose a major challenge to the world, where trends such as population growth and increased living standards can entail a barrier for decreasing the GHG emissions (Hickman et al., 2010). About 23% of the world's energy-related CO₂ emissions derive from transportation (IPCC, 2014). As a result of economic growth and a growing urban population, urban freight transport has been increasing in order to support the growing demand for goods. Urban freight transport contributes to several issues such as noise pollution, air pollution, and traffic congestion. Furthermore, it emits GHG, which leads to climate change (Browne et al., 2012) and is a major user of fossil fuels (Hickman et al., 2010). In order to decrease the GHG emissions of transportation, cities are crucial actors (EU, 2019).

All urban areas require freight transport to deliver products and remove waste (Browne et al., 2012), where freight transportation supports trade and economic growth (Cui et al., 2015). There is a need for cities to strategically manage their freight transport flow in order to minimise its negative effects and be able to fulfil environmental targets (Browne et al., 2012). To date, transportation is one of the sectors which least fulfil its CO₂ emission reduction targets (Hickman et al., 2010). Managing freight transport is complex, as it is required to meet targets concerning operator's economic revenue as well as environmental targets (Zanni & Bristow, 2010). In addition, the many stakeholders within the freight transport system adds complexity (Cui et al., 2015). Goal conflicts can arise where the city implement contradictive targets and measures (Vogel, 2016).

Transport management is experiencing a paradigm shift, as it is moving away from a hierarchical traditional approach to a more decentralised approach, called the *sustainable mobility paradigm* (Gammelgaard, 2015; Johansson, 2019). According to the sustainable mobility paradigm, the management of urban freight transport should not solely be about optimising good deliveries – but also about organisational change management where stakeholder involvement and participation become key issues (Gammelgaard, 2015).

Often passenger transport is in focus for local authorities in Europe (Kiba-Janiak, 2017; Lindholm & Behrends, 2012). As Lindholm & Behrends (2012) and Lindholm (2012) show, local authorities lack knowledge and awareness of the possibilities and problems that are connected with freight transportation. In addition, cities have a reluctance to work with freight transportation in a strategic way and implement measures since they are afraid that this would decrease regional competitiveness (Lindholm & Behrends, 2012). Research show that there is a need for qualitative studies with non-positivist methods and a social science perspective in transportation studies, as these could broaden the scope and find different opportunities on how to mitigate the climate change impact deriving from transportation (Schwanen et al., 2011). This study aims to contribute to the research field where the focus is on the cities Gothenburg, Copenhagen, and Turku.

1.1. Aim and objectives

The purpose of this study is to investigate what the cities Gothenburg, Copenhagen, and Turku need in order to manage urban freight transport and what measures the cities have adapted to reduce the CO₂ emissions deriving from urban freight transport. The study aims to reflect upon how the elements included in the practice of municipal freight transport management relate to the sustainable mobility paradigm and identify measures to decrease climate change impact and reach sustainable mobility. The research question guiding the study is the following: *How are the elements included in the practice of municipal freight transport management related to the sustainable mobility paradigm and what further types of measures can be adopted to decrease climate change impact and reach sustainable mobility?* In order to answer this question, the thesis has a set of objectives:

- Identify reasons for managing freight.
- Identify materials needed for managing freight.
- Identify competences and knowledge needed to manage freight.
- Identify adapted measures aiming to reduce the CO₂ emissions deriving from urban freight transport.
- Reflect on how the elements of the municipal freight transport management practice relate to and can become more in line with the sustainable mobility paradigm.
- Reflect on what further types of measures that can be adopted to decrease climate change impact and reach sustainable mobility.

1.2. Delimitations

As highlighted by Cui et al. (2015) and Gammelgaard (2015) the freight transportation system includes several stakeholders such as freight operators, producers, consumers, authorities, and cities. In this study, the perspective from cities and municipalities are included. Other stakeholders' perspectives are, in other words, outside the scope of this study. The study focus solely on freight transportation. This means that passenger transportation, which cities also need to manage, is not included in this study. Gothenburg, Copenhagen and Turku are included in this study – meaning that other cities' experiences are left out.

2. Background

This chapter includes background information on the climate change impact of transportation and how transport is managed. The sustainable mobility paradigm is described, as well as the cities included in this study.

2.1. Climate change and transportation

The global mean temperature has risen about 1°C compared to pre-industrial levels. This is due to anthropogenic impact such as the burning of fossil fuels resulting in the release of GHG emissions to the atmosphere. The results are extreme weather like droughts and floods, sea level rise, biodiversity loss, and a decrease in food security (Allen et al., 2018). During the pre-industrial era, around before 1750, the global CO₂ atmospheric concentration was about 280 parts per million (ppm) (IPCC, 2007). In 2013, the global CO₂ atmospheric concentration exceeded 400 ppm (NASA, 2019). Since 2000, the global CO₂ atmospheric concentration has risen with 20 ppm per decade which is ten times faster than the increase rate during the past 800 000 years. (Allen et al., 2018). There is strong scientific agreement that this temperature rise and its deriving climate change are human-induced. Measures to mitigate climate change need to be implemented since it has serious consequences (Allen et al., 2018; Hickman et al., 2010).

The dominant fuel source in transportation is oil (Chapman, 2007; Liimatainen et al., 2014) where about 23% of the world's energy-related CO₂ emissions derive from transportation (IPCC, 2014). Road transportation is the transportation form that produces most GHG. The motorcar, buses, taxis, and freight transport are all included in this form of transportation – where freight transport is the major polluter of GHG. Road freight transport is responsible for about a half of the CO₂ emissions deriving from road transport. It is not solely the vehicle's emission that contributes to climate change. From a life cycle perspective, also the production and distribution emit GHG. For an average car, 76% of CO₂ emissions are deriving from the use phase, 9% from manufacturing, and 15% from losses in the fuel supply system (Chapman, 2007). In total, the CO₂ emissions deriving from the countries' road freight transportation differ. The total CO₂ emissions deriving from road freight transportation in Denmark is 1.14 Mt CO₂ equivalents. Sweden's road freight transportation produces almost the double amount of CO₂, ending up at 2.27 Mt CO₂ equivalents. Finland's total CO₂ emissions from road freight transportation is close to Sweden's, resulting in 2.21 Mt CO₂ equivalents (Liimatainen et al., 2014).

If the Paris Agreement's target to keep the global average temperature well below 2°C increase, striving for 1.5°C increase, compared to pre-industrial levels is to be met, radical change is required (Johansson, 2019). This change needs to take place at a systems level. In other words, incremental change is not enough (Vogel, 2016). In order to mitigate the CO₂ emissions from urban transport, trend-breaking strategies are needed (Hickman et al., 2010). Rockström et al. (2017) state that there is a 50% change of meeting the Paris agreement's target and has designed a roadmap showing that the GHG emissions need to halve every decade if the target is to be met. Larkin et al. (2018) criticises this roadmap for being too dependent on negative emission technology and states that faster reduction levels should be striven for.

In accordance with the Paris Agreement, Sweden have adopted a climate political framework stating that their GHG net-emissions should be zero by the year 2045 (Sveriges regering, 2017). Finland has also taken on this goal (Finnish government, 2018). Denmark's target is to be independent of fossil fuels by 2050 (Danish Energy Agency, 2019; Vogel, 2016). Sweden, Denmark, and Finland are all part of the European Union and are hence obligated to fulfil the EU target to reduce the GHG emissions deriving from transportation with 60% from the 1990 level by 2050 (EU, 2019; Liimatainen et al., 2014). In this target statement, the EU highlights that freight transport is crucial for economic growth and that the target should be fulfilled without reducing the mobility of goods (Liimatainen et al., 2014). Sweden has adopted a more far reaching target and decided to reduce the transport sector's GHG emissions with 70%, compared to 2010's levels, by 2030 (2030-sekretariatet, 2019; Stelling, 2014; Johansson, 2019). In order to fulfil the targets to decrease the GHG emissions of transportation, the EU states that cities and local authorities are crucial actors (EU, 2019).

Freight is defined as *“the physical carriage of goods by any mode. This includes the provision of services and utilities and the movement of municipal, commercial and domestic waste”* (Zanni & Bristow, 2010, p. 1775). Production and consumption are concentrated to cities where most freight transportation either starts or ends in urban areas. Urban freight transportation enable access to goods. A majority of the activities that take place in a city are supported or influenced by freight transportation flows. For instance, goods, food, and waste all require transportation. Urban population growth and economic growth are increasing the demand for urban freight transport. In addition, freight transportation and urban logistics support trade and economic growth. An efficiently managed urban freight transportation system can increase a city's economic competitiveness through reducing operating costs and improving producers' and consumer's access to different goods (Cui et al., 2015).

2.2. Transport management

Transport management is experiencing a paradigm shift, as it is moving away from a traditional approach focusing on state responsibility to an alternative and decentralised approach where the local level has more influencing power. This represents a shift from hieratical governance to collaborative governance (Gammelgaard, 2015; Johansson, 2019). In this alternative approach, the focus is on people rather than traffic. Social dimensions and accessibility replace the highlighting of physical dimensions and mobility. Streets are perceived as space rather than as roads and when evaluating outcomes, environmental and social aspects are taken into account – and not just economic ones. Stakeholder participation is seen as a prerequisite for policy implementation success. The alternative approach is seen as more sustainable than the traditional approach. This is because the alternative approach enables a more holistic and transdisciplinary approach to transport planning which explicitly acknowledges all three pillars of sustainability (Banister, 2008; Gammelgaard, 2015; Johansson, 2019).

According to the sustainable mobility paradigm, the management of urban freight transport should not solely be about optimising good deliveries – but also about organisational change management where stakeholder involvement and participation become key issues (Gammelgaard, 2015).

Table 1 shows an overview of the how the focus differs between the traditional mobility approach and the sustainable approach.

Table 1. Features in focus in the traditional and sustainable mobility paradigm. Adapted from Banister (2008) and EU (2013).

Traditional mobility paradigm	Sustainable mobility paradigm
Physical dimensions	Social dimensions
Mobility	Accessibility
Focus on traffic	Focus on people
Traffic flow and capacity as primary objective	Quality of life as primary objective
Street as road	Street as space
Motorised transport in focus	Hierarchal structure: pedestrians and cyclists in focus. Low priority of passenger cars
Forecasting traffic	Visioning cities
Economic evaluation	Multicriteria analysis, including social and environmental dimensions
Travel as a derived demand	Travel as a wanted activity and as a derived demand
Traffic engineering perspective	Transdisciplinary and holistic perspective
Expert planning	Participation and stakeholder involvement
Travel time minimisation	Travel time reliability and reasonability
Segregation of people and traffic	Integration of people and traffic

The EU are encouraging cities to apply the alternative, sustainable mobility approach in their transport management. Cities are advocated to make a *Sustainable Urban Mobility Plan* (SUMP). This is a strategic planning concept and document that puts emphasis on stakeholder involvement and policy coordination between sectors when addressing transport-challenges in urban areas (Robertson, 2015). Sectors such as transportation, environment, land use, economic growth, health, social policy, and energy should cooperate in order to receive a holistic and interdisciplinary perspective on the city’s urban transport. The focus is on people and their quality of life. In this way, the SUMP concept differs from the traditional transport planning which is characterised by a focus on traffic flow capacity where experts of traffic engineers make the decisions. The scope of the SUMP includes passenger and freight transport. A SUMP can support the city in reaching the EU’s climate and energy targets (EU, 2013). In general, urban areas manage their freight transport in a similar way – but varieties in strategies, focus areas, and approaches exists (Browne et al., 2012). The way transport is managed can include features that are in line with the sustainable mobility paradigm and, at the same time, it can include features that goes against this new paradigm and make the transition towards it more difficult (Isaksson et al., 2017; Johansson, 2019).

2.3. The cities included in this study

Gothenburg, Turku, and Copenhagen are all part of the Trans-European Transport Network (TEN-T). TEN-T connects 88 European cities through a road network including nine corridors (Vital Nodes, 2019).

Gothenburg is the second largest city in Sweden and includes about 564 000 residents (Göteborg stad, 2019). Gothenburg as a city is experiencing a rapid population growth. The connections between the city and the region of Gothenburg are increasing, as people to a bigger extent commute for work or housing outside the boundaries of the municipality (Göteborg stad, 2018). The region of Gothenburg has about 1 million residents (Marjomaa, 2017). Gothenburg is Sweden's leading port city, where Gothenburg has several ports that are important for Sweden's import and export of goods (NE, 2018a). Gothenburg aims to reach a sustainable and equitable level of GHG emissions by 2050, this level is interpreted as 1.9 CO₂ equivalents per year and inhabitant (Göteborg & Co, 2019).

Copenhagen is the largest city in and the capital of Denmark. It includes about 613 000 residents. The region of Copenhagen includes about 1,3 million residents. Copenhagen is an important node for transportation where the port is among the largest ones in Denmark. Both passenger and freight transportation go through this port (NE, 2018b). Copenhagen aims to be carbon-neutral by 2025 (City of Copenhagen, 2019).

Turku is the fifth largest city in Finland and includes about 189 000 residents (NE, 2018c). In the region of Turku, about 310 000 people live. Business, tourists, and the academia contributes to a strong economic growth rate in this region (City of Turku, 2019). Turku aims to be carbon-neutral by 2029 (City of Turku, 2018).

3. Previous research

In this section, previous research regarding measures for mitigating urban road freight transportation's climate change impact is described. In addition, scientific findings concerning cities' transport management is outlined.

3.1. Municipal freight transport management

From an urban planning perspective, urban freight transport is competing for space as also pedestrians, public transport, and passenger cars want to use the land available for transportation (Zanni & Bristow, 2010). Here, many cities feel a conflict between expanding the urban freight system for reasons of economic competitiveness and devoting urban land to other activities (Cui et al., 2015). In Paris, conflict arose between public and private stakeholders when the local authority expanded the lanes for public transport, which gave less space to freight operators (Gammelgaard, 2015). Planning for urban freight transport is complex as it is required to meet targets concerning operator's economic revenue as well as environmental targets (Zanni & Bristow, 2010). Goal conflicts can arise where the municipality implement contradictory targets and measures (Vogel, 2016). For the sake of sustainability, it is important that cities take on a pro-active role in managing their urban road freight flows (Lindholm & Behrends, 2012). When doing this, urban land use planning and freight transport planning needs to be incorporated - so that a holistic perspective can be received on the city's land use (Zanni & Bristow, 2010).

Numerous stakeholders and factors need to be considered by the city when managing freight transport (Gammelgaard, 2015; Lindholm, 2012). Examples of stakeholders in the urban freight transport system includes the local authority, residents, consumers, producers and freight operators (Cui et al., 2015; Gammelgaard, 2015). Urban road freight transportation is not only influenced by the city as external factors such as national and European legalisation, technological advancements, financial factors and political factors also play a role. When managing urban freight transport at the local level, all these factors need to be taken into consideration (Lindholm & Behrends, 2012) as well as the stakeholders' needs, wants and preferences. The number of stakeholders and internal and external influencing factors add complexity to the urban freight transportation system (Cui et al., 2015). Additionally, future trends and changes need to be considered in the planning process – such as a growing urban population and shortages of fossil fuels (Kiba-Janiak, 2017).

Often passenger transport is in focus for local authorities in Europe (Kiba-Janiak, 2017; Lindholm & Behrends, 2012). Generally, cities perceive freight transportation as a private industry where they have a low influencing ability and where optimisation is business driven (Lindholm, 2012; Lindholm & Behrends, 2012). As Lindholm & Behrends (2012) and Lindholm (2012) show, local authorities lack knowledge and awareness of the possibilities and problems that are connected with freight transportation. In addition, cities have a reluctance to work with freight transportation in a strategic way and implement measures since they are afraid that this would decrease regional competitiveness (Lindholm & Behrends, 2012). Local authorities have a reluctance implementing measures that would increase sustainability when these measures also challenge rapid economic growth (Vogel, 2016).

Cities need to strengthen their competence and knowledge regarding freight transportation and logistics to enable a better management of freight transport (Lindholm & Behrends, 2012). A holistic approach needs to be applied, where all modes of transport in the city is integrated and coordinated in the city's strategy – from public transport, passenger cars, bikes, pedestrians, to freight (Kiba-Janiak, 2017; Lindholm & Behrends, 2012). Many European cities have not included freight transport in their long-term transportation goals. In Europe, a discrepancy is present where some cities have a high knowledge and capacity to manage their urban freight transportation, and where others' capacity is low and negligible (Kiba-Janiak, 2017).

3.2. Approaches to municipal freight transport management

Transportation as a system include several elements. For example, people, means of transport, fuels, road and infrastructure, agencies, laws and rules, prices, and norms and values. In order to change the current transportation system – approaches can be implemented which targets one or several of these elements. Schwanen et al. (2011) highlight that there are path-dependencies in transportation studies. Quantitative and positivist methods are often used, where there is a focus on technology, market-based approaches, and infrastructure. Studies on passenger transport also gives attention to behavioral change. This forms a path-dependency circulating around approaches with ecological modernisation characteristics (Schwanen et al., 2011).

Within ecological modernisation, technology is seen as being able to curb emissions and combat climate change. It frames sustainability issues and give example of solutions that are within our current structures of economic growth, consumption, and production. Emissions can and should be reduced by improving the current systems, through for example increasing effectiveness and enhancing technology. Unsustainable lifestyles, consumption, and resource exploitation are not questioned in this paradigm. Issues of morality and demand are also left out (Vogel, 2016). Decentralisation and the involvement of different stakeholders are also important features of ecological modernisation (Schwanen et al., 2011).

An alternative approach to ecological modernisation is green governmentality. From this perspective, it is recognised that the earth has a carrying capacity that the economic system needs to be held within. Resources are restricted and should be divided fairly. Green governmentality sees top-down management as the best way to achieve this fair distribution. In addition, climate change should be managed from a top-down perspective (Schwanen et al., 2011).

Schwanen et al. (2011) concludes that there is a need for qualitative studies with non-positivist methods and a social science perspective in transportation studies, as these could broaden the scope and find different opportunities on how to mitigate the climate change impact deriving from transportation. The appliance of social practice theory would, for instance, enable for new insights regarding the transportation system (Banister et al., 2012; Schwanen et al., 2011).

3.3. Measures for decreasing CO₂ emissions from urban road freight transport

There are several measures that can be implemented in order to reduce the CO₂ emissions from urban road freight transportation (Browne et al., 2012). Initiatives from private operators and cities are needed when wanting to increase the sustainability of urban road freight transportation (Lindholm & Behrends, 2012). In order to mitigate the climate change impact from freight transportation, a decrease in freight tonnes, reduction of tonne per kilometre, optimisation of logistics, increase in the proportion of rail transportation, and improved consumer awareness are needed (Liimatainen et al., 2014). In other words, both technological and behavioural approaches are expected to be needed. However, improving loading and logistics are perceived as more viable solutions (Chapman, 2007). Economic and legal measures are often implemented to stimulate the development of new technology. Knowledge-based measures, such as information campaigns and education, are generally enforced to achieve logistical improvements (Stelling, 2014).

Examples of technical solutions include vehicle design, engine performance, and type of fuel used. The fuel efficiency of road freight transportation has increased by 20% since the 1980s due to improvements in vehicle design and engine performance. Vehicle operation and driving style is expected to be able to make further improvements of 10-15% (Chapman, 2007). Most European cities have implemented initiatives regarding restrictions on vehicle type, weight, size, and unloading. These are more traditional measures, whereas environmental zones, congestion charging, night deliveries and fill-rate restrictions are examples of newer restriction initiatives that cities implement (Lindholm, 2012). Distance savings of about 10% is expected to be enabled by the use of software solutions. Moving road freight transport to rail is also a possible measure to decrease CO₂ emissions, as rail freight transport produces 20% of the CO₂ emissions that road transport does. This is, however, dependent on rail infrastructure, maintenance, and assured rights of access (Chapman, 2007).

The local city level is lacking mandate to implement all types of measures, as national and international policies and agreements also plays a role. For instance, cities cannot typically implement fuel taxes or vehicle engine emission standards as these initiatives are on the national and international level (Browne et al., 2012). In London, the local governmental body Transport for London provides courses to urban road freight transport operators (Browne et al., 2010). For example, there are courses on how to minimise the environmental impact of the vehicle through eco-driving, fuel choice, and route planning (FORS, 2019). Increased deliveries at night and off-hours can improve the environmental performance of deliveries, as the transportation flow then is better (Holguín-Veras et al., 2018). Here, silent vehicles become needed to not disturb residents.

There is improvement potential in tackling empty running, as it is common that the vehicle travels back empty when the freight has been delivered. Here, combining loads between operators could provide an answer as it could assist operators in finding return loads (Chapman, 2007). This type of measure requires coordination of stakeholders where the distribution of cost and revenue can be

difficult to set up. Other challenges with establishing a consolidation centre include contractual and organisational problems where the freight operators want to keep their supply chain advances to themselves. In addition, freight operators highlight loss of consumer contact and control as reasons for not joining a consolidation centre (Lindholm, 2012).

In London, UK, a consolidation centre for construction goods was established as a trial project during 2005-2007. This centre was based about five kilometres outside the City of London and coordinated goods for four construction sites located in the city. The centre had a capacity of ten days of storage, coordinating the deliveries from construction suppliers to the four construction sites. The purpose of the project was to decrease traffic congestion and CO₂ emissions caused by construction freight transportation through coordinating deliveries and thereby reducing the number of deliveries to the construction sites (Browne et al., 2012). The centre resulted in a 75% reduction in CO₂ emissions deriving from the four construction sites' deliveries and a decrease of 68% in the number of vehicles to the sites. Similar examples exist in France, where the implementation of urban distribution centres has resulted in a 61% reduction of fuel consumption. It is estimated that these centres receive and coordinate 10-20% of the urban goods (Zanni & Bristow, 2010). Also the Netherlands have consolidation centres in operation, where different transport companies cooperate in several cities in order to increase vehicle efficiency and reduce the number of vehicle kilometres (Browne et al., 2012).

Neither technological nor logistical improvements will, nonetheless, tackle the increased demand for freight transport. Approaches targeting human behaviour, consumption, and dematerialisation are here needed (Chapman, 2007; Zanni & Bristow, 2010). Policies that expand manufacturer responsibility to concerning the whole life cycle of the product can help. The number of kilometres a product is transported can be reduced by promoting regional products through, for example, information campaigns targeting consumers (Chapman, 2007).

When managing urban freight transportation, cities need to find an appropriate mix of strategies and measures. For instance, consolidation centre could be used together with restriction regulations. When implementing measures, good communication and involvement of stakeholders are important for success. Change management becomes relevant as measures can require a change in behaviour from transportation stakeholders (Lindholm, 2012).

4. Theoretical framework

This section presents the theoretical framework of this study; Social Practice Theory. This framework was applied in order to investigate the elements within the practice of municipal freight transport management. The purpose of this study is to investigate what the cities Gothenburg, Copenhagen, and Turku need in order to manage urban freight transport and what measures the cities have adapted to reduce the CO₂ emissions deriving from urban freight transport. The study aims to reflect upon how the elements included in the practice of municipal freight transport management relate to the sustainable mobility paradigm and identify measures to decrease climate change impact and reach sustainable mobility.

Historically, social practice theory has been applied to organisational and consumption studies. It is rather recently that it is being applied to transportation studies (Birtchnell, 2012). For instance, Johansson (2019), Wilson (2012) and Schwanen et al. (2011) takes on social practice theory when studying transportation and mobility. As Johansson (2019) states, social practice theory is a useful theoretical framework for identifying neglected policy opportunities and is suitable when analysing the transition towards the sustainable mobility paradigm. In this study, social practice theory was used to guide the structuring of the results but was not used as a basis for the analysis or discussion.

4.1. Social Practice Theory

Social Practice Theory (SPT) include a diverse and heterogeneous body of literature. However, key features exist where work by Bourdieu and Giddens has gotten most of the recognition. SPT draw on ideas from sociology and philosophy (Kennedy et al., 2015). In SPT terminology, the term practice is crucial (Birtchnell, 2012; Shove et al., 2012). Reckwitz (2002, p. 249) defines a practice as:

“a routinized type of behaviour which consists of several elements, interconnected to one other: forms of bodily activities, forms of mental activities, ‘things’ and their use, a background knowledge in the form of understanding, know-how, states of emotion and motivational knowledge” (Reckwitz, 2002, p. 249).

This quotation highlights that a practice is closely related to a routinized activity that is not performed in a vacuum but affect and is affected by associated elements. Watson (2012) states that any activity that is recognisable can be perceived as a practice. Practices are patterns that include several single activities (Watson, 2012). According to Johansson (2019) and Watson (2012), transport management can be regarded as a professional practice. SPT focuses on mutually constructed social practices (Johansson, 2019; Reckwitz, 2002; Watson, 2012) - rather than individual behaviour, discourses, or technological systems. The focus is on the local, immediate, and the details of doing the practice (Watson, 2012). SPT believes that conscious decision-making is only a small part of practice performance. Instead, it is interested in semi-conscious processes that are collectively constructed in society (Birtchnell, 2012; Schwanen et al., 2011).

In the SPT framework, practice is seen as mutually constructed by socio-cultural context, materials, and the individual agency (Johansson, 2019). For example, new technology can influence and change the practice as new technology opens up for new ways of doing things (Feldman & Orlikowski, 2011). Norms and values also influence the practice as it establishes what is seen as acceptable and desirable to do – and what is not acceptable and desirable to do. Norms and values change as human activities change. In this way, SPT mean that the practice affect the socio-cultural context – and that the socio-cultural context affect the practice (Johansson, 2019). Agency and structure are, in other words, interlinked where they mutually construct each other (Feldman & Orlikowski, 2011).

According to SPT, practices are dependent on and do not exist without performance. In other words, when a person is doing something that person is also performing a practice (Shove at al., 2012; Watson, 2012). If the performance disappears, so does the practice (Johansson, 2019; Shove et al., 2012). People are recruited to practices and as they perform practices, they become carriers of these practices (Shove et al., 2012; Watson, 2012). Established routines such as unconscious habits, routinised behaviour performed to make everyday life easier, and historical routines affect the way that the practice is carried out (Johansson, 2019). Practices are established when a majority of practitioners perform the practice in the same way. When this normality is formed, it can be difficult for policymakers to change and influence the practice. To change a practice, the practitioners need to create a new normal (Birtchnell, 2012). Practice change is not simply about changing behaviour and doing something else. Rather, it can require new technology, the setting aside of cultural norms, and the adjustment of additional routines. By applying SPT, the focus is on social practices – rather than the individual behaviour in itself (Johansson, 2019).

4.1.1. Elements – a conceptual framework

Since the SPT framework is broad and heterogeneous, the researcher using the framework needs to explicitly explain which approach to SPT that is used (Halkier & Jensen, 2011). In this study, the conceptual SPT framework by Shove at al. (2012) is in focus. This framework frames SPT in the way of elements, saying that practices consists of elements. Here, the focus is on analysing practices from the perspective of the elements *meanings*, *materials*, and *competences*. Meaning refers to values, norms, ideas, and rules in the practice. The term material includes material objects within the practice as, for example, vehicles, infrastructure, and parking space. Competence refers to knowledge, expertise, and skill needed in the practice. A practice does not solely include these elements (Johansson, 2019; Shove et al., 2012) and it is important to also highlight the linkages between the elements. As the elements and the linkages between them change, the practice also changes. In this way, practices emerge, persist, and disappear. Stable and routinised practices should hence not be perceived as end points, but rather as similar elements which linkages are repeatedly connected in the same way. In such manner, practices are defined as the continuing integration of elements (Shove et al., 2012). In this study, the elements will be searched for in the data using the following questions as guidance:

Meanings – What are the reasons for engaging in and performing the practice of municipal freight transport management?

Materials – What materials, or physical objects, are needed to perform the practice of municipal freight transport management?

Competences – What skills and knowledge are needed to perform the practice of municipal freight transport management?

New practices emerge when new connections are made between new or existing elements. Hence, practices are dependent on the availability of elements. The presence and access of elements does not guarantee that the elements will be linked together to form a certain practice. This simply means that there is potential to form a certain practice. As mentioned above, practices change. Elements, however, do not. They are stable and last in different ways, where new or additional elements can be included in a practice. Elements are interconnected, interdependent, and shape each other. For example, the emergence of a new technology (a new material element) can both spark the creation of new competences and meanings as well as spark the collapse of competences and meanings (Shove et al., 2012). Ways of thinking can be overturned, in what Kuhn (1970) calls paradigm shifts. Linkages between elements that have not yet appeared are referred to as a proto-practice. When linkages between elements disappear, it is referred to as an ex-practice (Shove et al., 2012).

Elements form and can spread between places. Material elements are generally dependent on physical transportation and access to spread from one place to another. Competence is more complex, where education, libraries, and the Internet can facilitate its travelling but does not guarantee that the competence gets used. For meanings, mass communication plays an importance in the spreading – although it does not guarantee it. Meanings are de- and reclassified as old and new connotations are constructed as a result of a dynamic association process (Shove et al., 2012).

SPT does not offer any direct solutions regarding how to change a practice, instead it enables an opportunity to understand the practice in focus (Shove et al., 2012). This understanding, however, can facilitate the change of a practice. By understanding the meanings, materials, and competences in the practice, missing features can be identified. This can facilitate the identification of missing policy opportunities (Johansson, 2019).

5. Method

In this section, the methods used to collect data and analyse the empirical material is described. The data collection method consists of a mixed-method approach including qualitative document analysis and qualitative semi-structured interviews. In research with qualitative data, it is common to study the same phenomenon using at least two different methods. Interviews and document analysis can be used together in order to reduce biases (Bowen, 2009; Owen, 2014). The data was analysed with guidance from the conceptual SPT framework provided by Shove et al. (2012), where meanings, materials, and competences needed to perform the practice of municipal freight transport management was searched for. In this study, the document analysis focus on identifying meanings. In the data deriving from the interviews, meanings, materials, and competences needed to perform the practice was searched for. The sustainable mobility paradigm, as described by Banister (2008), was used as a basis for the analysis and discussion where the identified elements were put in relation to the sustainable mobility paradigm.

5.1. Document analysis

Documents are texts that are produced without the researcher's intervention. Document analysis enable a systematic review of different texts. The texts are examined and interpreted in order to gain understanding and produce empirical knowledge. Objectivity and sensitivity should be striven for (Bowen, 2009). In this study, a qualitative document analysis was conducted on two documents consisting of the SUMP's of Gothenburg and Copenhagen. Turku had to be left out of the document analysis since their SUMP was not finalised at the time of the thesis. The documents are planning documents produced by each city. The documents include information on how the city manage passenger transport and urban freight transport flows. Table 2 presents an overview of the documents.

Table 2. The documents included in the study.

City	Name of document	Publisher	Published
Gothenburg	Gothenburg 2035 – Transport strategy for a close-knit city	City of Gothenburg	2014
Copenhagen	Handlingsplan for grøn mobilitet	Københavns kommune	2012
Turku	-	-	-

Both documents were sent to me by the interviewees and were available on each city's website. In total, the documents included 157 pages of data. The data gathered from a document analysis consists of excerpts and quotations (Bowen, 2009). Gothenburg's SUMP is available in both Swedish and English. I chose to conduct the analysis on the English version in order to avoid translating the results from it. Copenhagen's SUMP is written in Danish. The quotations from Copenhagen's SUMP in the results section of this thesis is translated from Danish to English by me. The analysis of the documents generally includes finding, selecting, making sense of, and synthesising this data. The aim and objectives of this study, along with the theoretical framework of STP, inspired and formed the analysis of the documents. Information on how the analysis was conducted can be found under the heading *5.3 Analysing the material*.

5.2. Qualitative semi-structured interviews

In order to deepen the understanding of the freight transport management practice, *qualitative semi-structured* interviews were held with employees at the municipalities of the cities. Qualitative semi-structured interviews are a suitable scientific method when investigating perceptions and experiences of a topic (Gill et al., 2008). The method incorporates flexibility since it is semi-structured – something which enables for an open conversation where questions that are not included in the interview guide can be raised (Doody & Noonan, 2013; Lundberg, 2013).

This study includes five interviews and six interviewees, where each interview was between 40-60 minutes. Table 3 includes an overview of the interviewees in this study. Two interviews were held with two employees at Gothenburg municipality; one working as a freight strategist and one working as an environmental strategist at the traffic office. These two interviews took place at the respondents' office in Gothenburg and were held in Swedish. The quotations from these interviews in the results section has been translated from Swedish to English by me. Regarding Copenhagen, one interview with two respondents was conducted. The employees worked as a logistics expert and a project leader at the traffic office. In the city of Turku, one interview was conducted with a freight project leader and one with an environmental strategist. Due to time constraints, the interviews with Copenhagen and Turku was held via Skype as the travelling time then was reduced. These three interviews were held in English. This was because of my limited knowledge in Danish and Finnish. There are challenges with conducting interviews in English with people who have English as their second language (Barriball & While, 1994). Language has been identified as a barrier for interview studies. Advanced question formulations should be avoided in order to minimise the risk of misunderstandings (Marshall & While, 1994).

Table 3. The interviewees included in the study.

Interview number	Interviewee	City
Interview 1	Freight strategist	Gothenburg
Interview 2	Environmental strategist at the traffic office	Gothenburg
Interview 3	Project leader at the traffic office	Copenhagen
	Logistics expert	Copenhagen
Interview 4	Freight project leader	Turku
Interview 5	Environmental strategist	Turku

5.2.1. Before conducting the interviews

An interview guide was developed in advance of conducting the interviews (Doody & Noonan, 2013). The study's purpose and aim guided the formulations of the questions which should be neutral, understandable, open-ended (Gill et al., 2008; McNamara, 2009; Turner, 2010) and follow a logical structure (Doody & Noonan, 2013). The first couple of questions should be simple and relaxed in order to ease the interviewee into the interview situation (Doody & Noonan, 2013; Gill et al., 2008). When giving critique or wanting to explore drawbacks of an implemented measure, it is recommended to start on a positive note and ask the respondent to present good outcomes first. Sensitive questions should be saved until last when trust between interviewee and interviewer has been established (Adams, 2015). I learnt the interview guide by heart in order to be able to be more attentive to the interview situation. Both Adams (2015) and Doody & Noonan (2013) recommend this.

As recommended by Adams (2015) and Doody & Noonan (2013), I sent the interview guide to other persons to receive feedback on the questions and the interview structure. I sent the interview guide to my supervisors at KTH Royal Institute of Technology and at the Swedish Transport Administration. With consideration to their feedback, I finalised the interview guide. I then prioritised the questions so that I, in case of a lack of time during the interview, knew what to focus on (Adams, 2015). I also wrote an information sheet where I described the confidentiality and research ethics connected to the interview. This is recommended by Doody & Noonan (2013). The information sheet is presented in Appendix I. The interview guide can be found as Appendix II.

The respondents were identified in cooperation with my supervisor at the Swedish Transport Administration and my contact person regarding freight transport at the Swedish Transport Administration. I aimed at interviewing employees at the city with knowledge on how they manage their freight transport and how they try to decrease the CO₂ emissions from this type of transport. Hence, the respondents were chosen on the criteria that they should work with freight transportation or environmental traffic issues on a strategic level at the city. First contact with respondents was established via e-mail, as recommended by Adams (2015). When the respondents did not answer my e-mail, I gave them a call and decided on a time for the interview. Since the interviewees asked for it, I sent out the interview guide in advance to them.

5.2.2. During the interviews

As highlighted by Doody & Noonan (2013) the place for the interview plays a role on the interviewee's comfort and can hence affect the answers given. The site should be convenient for the respondent and free from interruptions. A site where the respondent is in control is preferable (Doody & Noonan, 2013) - as was the case in this study. The respondents from the city of Copenhagen and the city of Turku had the freedom to choose the interview site completely by themselves since these interviews were held via Skype. For the interviews from the city of Gothenburg, the interviews took place at the respondents' workplace. Skype or telephone interviews are ancillary to face-to-face interviews as nonverbal cues and body language can be missed. However, some research advantages exists as they can decrease costs and allow for larger

geographical access. Researchers argue that this type of non-face-to-face interviews are legitimate and productive (Lechuga, 2012).

When conducting interviews, it is crucial to notice that the researcher's approach can affect the answers given by the respondent. To begin with, I presented the information stated in the information sheet. I thanked the interviewee taking the time to meet me, explained the purpose of my study, and stated that I am interested in the interviewee's own perceptions and that there are no right or wrong answers. In addition, I highlighted that the interviewee will stay anonymous throughout the study. Doody & Noonan (2013) states that anonymity is important as respondents otherwise can feel defensive. In my study, it is not important to mention the respondents by name and therefore the result is not affected by that the respondents are anonymous. Since all respondents agreed to it, the interviews were reordered. This later on enabled a transcription of the interview and facilitated the analysis.

5.2.3. After conducting the interviews

I transcribed the interviews manually based on the recording of each interview. The website www.otranscribed.com helped me with the transcription as it enables a feature where it was possible to listen to the audio file in a slower tempo. Transcription is an important step in the interview process as the researcher through this gets to know the material and receives an overview of it (Dalen, 2015). The interviews become text material when transcribing them. I transcribed hesitation, sarcasm, laughing, words, and sentences. Variations in tone of voice was left non-transcribed as I considered this as being unimportant for my study as well as too time-consuming to transcribe. In total, 53 pages of transcribed material was obtained from the interviews. The analysing method is further described under the next heading.

5.3. Analysing the material

When analysing qualitative data, it is important to group the material and set up relevant themes relating to the purpose and research question of the study (Ryan & Russel Bernard, 2003). In this study, I let the SPT framework steer this grouping and thematisation of the material. When interpreting the text, the elements meanings, materials, and competences was searched for. This in accordance to the conceptual framework of SPT by Shove et al. (2012). In the analysis of the documents, I searched for meanings needed to perform the practice. In the data deriving from the interviews, I searched for meanings, materials, and competences needed to perform the practice. When identifying meanings, the respondents' and the texts' reasons for performing the freight transport management practice was investigated. For materials, things and physical objects that the respondents' needed to perform the practice was identified. Regarding the identification of competences, knowledge and skills that the respondents' needed to perform the practice was highlighted. This was done in order to identify the elements within the freight transport management practice. When identifying themes within the elements, I strived for designing a logical grouping – as stated by Owen (2014).

After the elements within the freight transport management practice was identified, the sustainable mobility paradigm, as described by Banister (2008), was used as a basis for the analysis. The identified elements were compared with the features of the sustainable mobility paradigm, where similarities and differences were searched for. This was done in order to relate the elements of the freight transport management practice to the sustainable mobility paradigm.

The texts were coded and analysed one at a time. However, this was an iterative process where I went back and forth between the texts several times as new potential meanings, materials, or competences were discovered. I skimmed, read, and interpreted the texts in an iterative process – as described by Bowen (2009). This was done in order to decrease sources of errors and increase the reliability and intrasubjectivity (Bergström & Boréus, 2000). The coding was conducted independently and manually by me and guided by the conceptual SPT framework by Shove et al. (2012) and the purpose of the study. When performing coding manually, a larger room for mistakes exist than when using a software and hence regular re-checks became important (Zhang & Wildemuth, 2009).

5.4. Validity and reliability

There are several strategies that a researcher can use to increase the validity of a study (Oldensjö, 2018). For example, the usage of several methods increases the validity of the results (Bowen 2009; Creswell, 2014; O’Leary, 2014; Owen, 2014). In this study, both document analysis and semi-structured qualitative interviews were used to collect data. This triangulation where different approaches are used to investigate the same phenomenon validate the findings. Another strategy to increase the validity is to explicitly state the researcher’s background and describe how this can have influenced the findings. Here, self-reflecting becomes of importance (Creswell, 2014). This study might have been affected by my background and interest in environmental science, sustainable consumption, and climate change mitigation. There is a possibility that this background and interest have affected the results of the study and, for example, influenced what was thought to be of interest. By clarifying this, validity is added to the study (Creswell, 2014).

Transparency becomes important for the study’s reliability and ability to replicate it (O’Leary, 2014). In this study, transparency is in focus where I have striven to describe the methods in detail and, for instance, provided more information in the appendixes where the information sheet (appendix I) and interview guide (appendix II) can be found.

6. Results

In this section, the results from the interviews and the document analysis on Gothenburg's and Copenhagen's transport strategy are presented and put in relation to social practice theory. The purpose of this study is to investigate what the cities Gothenburg, Turku, and Copenhagen need in order to manage their urban freight transport and what measures the cities have adapted to reduce the CO₂ emissions deriving from urban freight transport. First, the conceptual framework by Shove et al. (2012) is used to structure the results in accordance to the elements meanings, materials, and competences. The identified meanings, materials, and competences included in the freight transport managing practice is outlined. Some of these elements' characteristics might be similar since the three elements are connected to and shape each other (Shove et al., 2012). Table 4 provides an overview of the meanings, materials, and competences that has been identified in the practice.

When putting the identified elements in relation to the sustainable mobility paradigm, as described by Banister (2008), an approach that seem to be excluded from the practice was recognised. This is the approach of incorporating the need that steers the freight transportation in the freight transport management practice. This approach is outlined after the identified elements. Lastly, the measures that the cities have adopted are outlined. Table 5 below describes how each respondent is labelled in the text.

Table 4. Meanings, materials, and competences included in the freight transport management practice.

<i>Elements</i>		
Meanings	Materials	Competences
Reducing environmental impacts	Funding	Systems perspective
Reducing negative social impacts	Guidelines	Understanding the private sector
Ensuring good ease of passage for freight transports	Personnel resources	Cooperation
Strengthening the economy and creating jobs		Seek and manage funding
Avoiding conflicting goals and finding joint solutions		Transport planning
		Procurement and planning of the own municipal freight transportation

Table 5. Labelling of the interviewees.

Interviewee	Labelled in text
Freight strategist, Gothenburg	G1
Environmental strategist at the traffic office, Gothenburg	G2
Project leader at the traffic office, Copenhagen	C1
Logistics expert, Copenhagen	C2
Freight project leader, Turku	T1
Environmental strategist, Turku	T2

6.1. Meanings

For the element meanings, the documents' and the respondents' reasons for managing the city's freight transportation are outlined. The documents and the interviews showed that *reducing environmental impacts, reducing negative social impacts, ensuring good ease of passage for freight transports, strengthening the economy and creating jobs and avoiding conflicting goals and finding joint solutions* are reasons for managing the freight transportation. These are hence seen as meanings in the practice.

6.1.1. Reducing the environmental impacts

Both strategy documents and all respondents state that one or more measures are being implemented in order to decrease the environmental impact from freight transportation. In other words, reducing the environmental impact is one reason for the practitioners to manage the freight. In some of these quotations, environmental impacts such as emissions are mentioned at the same time as impacts on humans; such as noise pollution and barriers. Environmental and social impacts seem to be closely related. In some quotations, environmental impacts are also connected to the urban planning practice. The transport strategies for example states:

“When planning for good ease of passage, negative social and environmental consequences must be considered (City of Gothenburg, 2014, p. 56).

“We shall create the best conditions so that the businesses can deliver their goods in the most efficient and environmentally friendly way and that Copenhagen can develop and grow in a green direction (Københavns kommune, 2012, p. 5).

When asked what the aim of some of their freight projects is, the interviewees answer that reducing CO₂ emissions are in focus. All respondents mention that reducing the environmental impacts are an important feature of projects and measures. CO₂ emissions are in focus. However, some importance is also given to the environmental aspect of air quality and the social aspect of noise pollution. The interviewees for instance mention:

“The main goal [of the consolidation centre] is of course to reduce the CO₂ emissions in city centres” (T1).

“And at the same time, we want to reduce the harmful environmental impacts, including emissions and noise and some usage of space within the urban area. And at the same time, we want to have an impact on reducing emissions to the atmosphere, carbon, greenhouse gases” (T2).

“The purpose of this [city logistics] project is, of course, to sustain the CO₂ neutral goal of the city of Copenhagen. But there´s also impact on noise and air pollution” (C1).

Some measures for decreasing the environmental impact are mentioned. For example, *“Electrification of roads for transport of goods is one way of limiting the environmental impact”* (City of Gothenburg, 2014, p. 58). Here, technological advancement and innovation is given importance. Copenhagen is on the same track, stating that electric cars and *“the usage of alternative fuels for both passenger transport and good deliveries”* (Københavns kommune, 2012, p. 14) are seen as important.

Gothenburg’s strategy document further states that:

“Large goods volumes can cause more noise and air pollution, as well as barrier effects. A success factor for minimising the negative consequences is collaboration with other stakeholders, such as the Swedish Transport Administration, the Port of Gothenburg and the surrounding municipalities in order to increase railway capacity, control goods flows and optimise the localisation of logistics centres. The city’s considerable transport needs are problematic from the socioeconomic and climate perspectives. The load on roads and rail must be generally minimised through increased efficiency, e.g. by means of increased rates of capacity utilisation” (City of Gothenburg, 2014, p. 54).

In this quotation, collaboration with stakeholders is seen as meaningful as it is a way to increase transport flow efficiency and shift freight transport flows to railway. Transport flow efficiency is hence also perceived as important. To summarise, technology, collaboration, and transport flow optimisation is seen as important in order to decrease the environmental impact from freight transportation flows.

6.1.2. Reducing negative social impacts

Both documents and all respondents highlight social aspect such as safety, noise pollution, and well-being as a reason to manage the freight. The focus is here on reducing the negative effects that freight transportation has on social aspects. Hence, the cities seem to perceive it as important to reduce the negative social impacts deriving from freight transportation. Traffic safety and to reduce the number of accidents where freight transporting vehicles is included is discussed by G1, C1, C2 and T1. To create an urban environment with a high liveability standard and where people can thrive is highlighted by G1 and T1. Gothenburg's transport strategy mentions that applying a social perspective when planning the location of new activities, can reduce the negative social impacts deriving from the new activities. Here, an urban planning perspective becomes important. To exemplify, the cities mention:

“Emissions, noise and road safety are all factors that greatly influence people's health and sense of security, and which must therefore be given the appropriate consideration in decisions” (City of Gothenburg, 2014, p. 56).

“City Logistics project will create a reduction of CO₂, noise and air pollution from the heavy traffic in Copenhagen” (Københavns kommune, 2012, p. 57).

“Also to reduce the noise pollution levels and create something that suits the urban environment to give the citizens a possibility to be able to be and act in the city in a good way” (G1).

“We have to improve traffic safety” (C1).

“Reduce the number of cars in city centres and make improve safety and comfort for people in centres” (T1).

6.1.3. Ensuring good ease of passage for freight transports

Good ease of passage for freight transportation is at the centre of Gothenburg's freight transport strategy. Efficiency, optimisation, and a minimisation of flow disturbances are in focus. Gothenburg mention that *“the city will strive to ensure that transport of goods can run smoothly and to minimise the risk of disruptions”*. It is further highlighted that *“preventive measures and extra safety measures can reduce the risk of disruptions”* (City of Gothenburg, 2014, p. 55). Copenhagen is on the same track, stating that *“the freight operators waste working hours on standing in line”* (Københavns kommune, 2012, p. 8). To ensure a good ease of passage for freight is, in other words, a reason to engage in the freight transport management practice.

Three respondents (G1, C1 and T2) explicitly mention that good ease of passage for freight transport is important. One reason for managing the freight is, in other words, to ensure good ease of passage for the freight transporting vehicles. Two respondents (G1 and C1) mention that ensuring good accessibility is at the core of their working tasks:

“And my task then, in a more concrete way, is to secure the accessibility for the private enterprises’ transportations within the city” (G1).

“In my new position I work, for example, in partnership with all our municipalities and government to enhance capacity and flow on transportation across municipality borders” (C1).

The importance of good ease of passage is connected to other meanings. For instance, it is mentioned that Gothenburg should be *“ensuring good accessibility for goods transport in Gothenburg while at the same time reducing negative local environmental effects”* (City of Gothenburg, 2014, p. 54). T2 states that when freight transport is planned to roads *“where it is expected that the logistic transport flow is rather smooth”*, the environmental impact from the freight transportation is reduced. In this way, good ease of passage is linked to reducing the environmental impact. G1 makes a connection between good ease of passage and socioeconomic aspects, where good ease of passage is seen as important in order to keep the socioeconomical costs down:

We have to in one way or another stimulate so that they still get a good accessibility in the city. Otherwise the socioeconomic costs increase and that means that the social benefits decrease for the ones we are working for” (G1).

Copenhagen links freight’s good ease of passage to economic factors:

“Better freight mobility increases the city’s competitiveness and attractiveness” (Københavns kommune, 2012, p. 15).

“Transport is necessary for the city’s life, development and economy – goods shall come in and out of the city” (Københavns kommune, 2012, p. 5).

Another reason for ensuring good accessibility is highlighted by Gothenburg:

“Ease of passage refers to the time it takes to get from one strategic point to another. Transport times directly affect the attractiveness of doing business in Gothenburg, but it is not only the time it takes to get to port, logistics and industry areas which is interesting – the variation in time is also important” (City of Gothenburg, 2014, p. 59).

This quotation point out that good ease of passage is important for the freight distributors and that this will affect the decision on where they choose to put their transport flows. Here, both the transportation time and the variation in time becomes important.

Gothenburg mentions that *“A success factor for minimising the negative consequences is collaboration with other stakeholders, such as the Swedish Transport Administration, the Port of Gothenburg and the surrounding municipalities in order to increase railway capacity, control goods flows and optimise the localisation of logistics centres”* (City of Gothenburg, 2014, p. 54). In other words, collaboration is seen as important for achieving good ease of passage for freight transport.

6.1.4. Strengthening the economy and creating jobs

Strengthening the economy and creating jobs are other motivations for managing the freight. Copenhagen states that *“Better freight mobility increases the city’s competitiveness and attractiveness”* (Københavns kommune, 2012, p. 15). In the interviews, T2 explicitly mentions that competitiveness and a flourishing economy is important:

“The city wants to have a competitive and flourishing economy, that’s why. So, they want to facilitate good business possibilities” (T2).

In these quotations, freight transport is seen as important for the economy and for job creation. In other words, strengthening the economy and creating jobs are reasons for engaging in the freight transport management practice. Gothenburg highlights that it is of importance to satisfy the freight creating industries’ needs. Regarding this, Gothenburg for instance mentions that *“the expansion needs of activities need to be met”* (City of Gothenburg, 2014, p. 57), *“it is important to identify the industry’s need for expansion areas and access roads at an early stage of planning”* (City of Gothenburg, 2014, p. 57) and that *“several combined transport terminals will be established in locations strategically chosen from a socioeconomic as well as a customer perspective”* (City of Gothenburg, 2014, p. 55). These quotations show that Gothenburg gives significance to industry development and to pleasing the industries’ needs in terms of, for example, expansion and customers. In addition, innovation and proactive work is given significance as a way to strengthen industrial activities: *“By working proactively with heavy goods transports, industrial activity will benefit both from the development of existing activities and new establishments”* (City of Gothenburg, 2014, p. 58).

It is mentioned that *“industry, retailing and logistics can be developed”* (City of Gothenburg, 2014, p. 54) if freight transportation is included in the urban planning. Here, the development of industry, retailing and logistics is given importance to achieve a strong economy and create job opportunities.

Gothenburg wants to be an attractive city in terms of freight transportation. This is for example shown in the following quotation: *“Access to new land for new manufacturing units, warehouses and stands is decisive for the city’s and the region’s attractiveness and for the jobs supply”* (City of Gothenburg, 2014, p. 56). The city perceives it as important to *“be at the leading edge of logistics”* (City of Gothenburg, 2014, p. 58) and want to *“gain international recognition as a testing ground for efficient, climate-smart goods handling”* (City of Gothenburg, 2014, p. 58). In addition, Gothenburg sees it as important to continue to top the ranking of logistics locations in Sweden, as *“The rankings are studied by businesses and have an effect on decisions regarding choice of locations, for example”* (City of Gothenburg, 2014, p. 59). These quotations show that Gothenburg sees it as important to be an attractive freight city where business want to put their freight transport flows, as this will lead to a stronger economy and the creation of more jobs.

6.1.5. Avoiding conflicting goals and finding joint solutions

A reason for managing freight is to avoid conflicting goals and to find joint solutions to problems that derive from freight transportation. This is first and foremost mentioned in Gothenburg's transport strategy and is, for example, shown in the following quotations:

“When planning new residential, industrial and green areas, the needs of goods transports will be considered in order to avoid unnecessary aims conflicts” (City of Gothenburg, 2014, p. 57).

“By including goods transport in the urban planning process and applying a regional perspective to the establishment of transport-intensive operations, industry, retailing and logistics can be developed and conflicts between goals can be avoided” (City of Gothenburg, 2014, p. 54).

In these quotations, it is given importance to put freight transportation in relation to other disciplines, such as residential housing, in order to avoid conflicting objectives. G1 mentions that as the city's density increases, the areas of conflict also increase:

“Amis conflicts can arise, as I mentioned earlier, when the urbanisation increases in the city” (G1).

When managing the freight, it becomes important to handle this situation and manage the conflicts that can arise from it. The transport strategy by Gothenburg mentions that *“goods producing and goods consuming activities will be directed, by means of targeted incentives, to the city's periphery or to specified industrial estates. Ferry terminals in the centre of the city with a large amount of lorry traffic will be moved to external locations”* (City of Gothenburg, 2014, p. 57). This seems to be implemented since less goals conflicts will be created if the major freight transportation flows are separated from the city centre where more people move around in a denser space. T2 mentions that Turku have a similar strategy.

C1 and G1 mention that discussion and networking can solve conflicts and improve the freight situation:

“And we have to work together to make the best possible situations as to flow and traffic safety for all modes of transport. To sit together to agree” (C1).

“As I said, very solution-oriented. We lift problems but the thought is not to put down the problem again, but to discuss it until it's solved. So, we don't put it back and let it become worse, but we try to find a way forward” (G1).

Conflicting goals can also derive from a lack of knowledge, as mentioned by G1. Knowledge transfer becomes important in order to avoid conflicting objectives:

“I think goals conflicts are based on lack of knowledge” (G1).

“We have no contact with the politics, we who are specialists. And we who are strategists. You don't have any knowledge transfer. And the ones sitting in the management at the traffic office knows nothing about... They have no expertise regarding freight issues – I'm the one having that.”

And then it becomes difficult to manage, it's difficult to reach the targets and then it is also a risk that you get goals conflicts. You can get goals conflicts automatically but I think that you sometimes get goals conflicts because you don't have knowledge" (G1).

Collaboration and knowledge transfer with policy makers are here highlighted as important in order to avoid conflicting goals.

6.2. Materials

When investigating the element of material in the freight transport management practice, resources and objects that the respondents' stated that they needed in order to perform the practice was investigated. The results from the interviews showed that the materials needed for the practice include *funding, guidelines, and personnel resources.*

6.2.1. Funding

All cities (G1, C1, C2 and T1) mention that they are in need of funding in order to be able to initiate and coordinate projects and other activities regarding freight transportation. The financial material can, for instance, derive from the EU or from the national level. For example, Copenhagen *"participated in a big Horizon 2020 called NodeBlock, where we put up a quality freight network"* (C2) that is still active.

Gothenburg mentions that they currently have at least two active EU projects regarding freight transportation. *"We have at least one EU project called Stadslandet, where we in one way or another will simulate city deliveries and electrical mobility as much as possible"* (G1). The other EU project is *"partly about urban water ways"* (G1) and transporting deliveries on the water in the city. Gothenburg also have a *"Vinnova project where we, for instance, will stimulate water ways"* (G1). In addition, Gothenburg *"got no regarding a Vinnova project called Smooth that would be about Volvo's new electric truck. That would go to Nordstan. So, now we restart this process. We got a no now. So we will restart it"* (G1). Here, it is highlighted that a planned project was delayed because of neglected funding. Funding is hence a prerequisite for realising that project.

C2 highlights that funding is important for initiating new projects but that the project, when established, should not be dependent on external funding as this can make the project less stable. Therefore, Copenhagen aimed at initiating a consolidation centre concept and then giving it away:

"So, we made different pilots of our deliveries and we made the concept development on city logistics. And we gave the concept away to a private company [...] They are still up and running because we wanted to prove as a municipality, with support from the transport authority, that you could make a sustainable and variable city logistics concept. Because as you have seen all around Europe, there are a lot of concepts that have been running for two- or three-years period and then the funding was over and then the concept had to close down. So, we wanted to prove that you can make a variable, economic, sustainable solution as well. But we are a municipality, we are not a

truck company, so we cannot go and do business. So in the end, we finalised the concept – we gave it away” (C2).

Turku is on a similar tack as they have an ongoing EU project where they have a consolidation centre which “*ends in the end of 2020*” (T1). By 2020, they “*hope that our solutions are business as usual, then. And our partner of companies are taking our solutions as their business*” (T1). As seen in all these quotations, funding is a basic for being able to initiate and establish freight projects and activities. Funding is hence a material within the freight transport management practice.

6.2.2. Guidelines

Copenhagen explicitly highlights that guidelines can help the city when managing its freight transportation. No one else of the respondents mention guidelines. C2 mentions that they just got guidelines from the national level guiding the city on how to handle off-hour deliveries. Through the guidelines, the city gets mandate and support on how to manage the freight:

“So now we have some, we have to decide on how we’re going to implement that in the city of Copenhagen, we need to have a paper of... Internal guidelines. How we can go forward with this national guidelines. And also how we can say no to companies that want to drive and maybe ruin this fantastic opportunity for others” (C2)

In other words, guidelines serve as a material within the freight transport management practice.

6.2.3. Personnel resources

G1 repeatedly states that personnel resources are needed within the municipality in order to manage the freight. G1 seems to be of the opinion that the freight transport management in Gothenburg would benefit if more people were working with freight on a strategic level:

“The knowledge regarding freight issues is really low within the cities generally. Gothenburg handles 6-7000 trucks per day; there is nowhere else that you have these huge amounts of freight that comes in, in one way or another. Many people are needed that work with this but there is no one in the cities who does it. We are only 2.5 – or 2 employees and then one at 20%” (G1).

“I actually only have two colleges [...] So actually, those are the closest colleges. There are not especially many that work with strategic questions regarding freight in Gothenburg” (G1).

No other respondent mentioned that personnel resources are needed or that they have a lack of employees working with freight related issues. G1 continues and compares the personnel resources that freight has with the public transport’s personnel resources:

“For example, look at the public transport. You have the whole organisation of Västtrafik behind the public transport in the region. There is a whole different amount of people working with that within the public sector. Here at the traffic office, we don’t have that many but that’s because

Västtrafik has so many. So they operate many questions. We have nothing similar regarding freight” (G1).

In this quotation, G1 highlights that there is a difference in the personnel resources of the public transport and the freight transport. Where the public transport have stronger personnel resources than the freight transport. Personnel resources are needed for the city's freight transport management; therefore, it is a material within the freight transport management practice.

6.3. Competences

Regarding the element competences, the knowledge and skills that the respondents' stated was needed to perform the practice of freight transport management was investigated. *Systems perspective, understanding the private sector, cooperation, seek and manage funding, transport planning, and procurement and planning of the own municipal freight transportation* was identified as competences in the practice.

6.3.1. Systems perspective

Four respondents (G1, C1, C2 and T2) state that a systems perspective needs to be applied when engaging in the freight transport management practice. G1 highlights that the whole traffic situation needs to be perceived as a system. Competence regarding how freight transportation and passenger transportation are connected is here required. If the system is not looked upon from a holistic perspective, suboptimal effects can be created:

“Because you cannot see the transport types in the city as pipelines, they need to be able to interact with each other. Because if you don't see it from a systems perspective where every transport type should, in one way or another, traffic the same and need to coexist - you cannot, I think, reach an optimal city center. I don't think so. It doesn't work. The risk is that you get suboptimal effects where you create something good here that becomes bad at some other place. And then you haven't gotten those effects that you really wanted, by working with sustainable urban development. And here I think it miscarries to a big extent... And it gets even more obvious if you get some congestion in the city, then it becomes even more important that you see it from a bigger perspective, overall, holistic perspective.” (G1).

G1 elaborates and mentions that the connections within the freight transporting system is necessary to have knowledge about:

“It is like it is a completely own area of expertise and if you haven't studied or worked with logistics you won't understand the connections. It surprises me a bit, because I think that I understand the connections within passenger transport. But the ones working with passenger transport doesn't understand the connections within logistics from a systems perspective, where you have different links that should be brought together. With several links in a system. One can understand if you drive a truck from A to B but then you add C, D and E and then it doesn't work. Then they don't want to participate anymore” (G1).

Copenhagen address that they apply the competence of systems perspective when managing the transportation flows in a dense city. For example highlighting that cargo bikes to a bigger extent will be more suitable and that night distribution is a possibility as the city grows denser. Here, a holistic perspective is applied when searching for new ways of handling the freight:

“Well, the positive thing about density is that a dense city – and Copenhagen is indeed a very dense city – it makes it more, it makes it easier for us to manage green mobility. Like, when there is a shorter distance between your house and the shops and the schools and the stations, it’s easier to choose walking and biking or public transport. As a system. As to the freight, I think perhaps it’s the same – that with shorter distances for example it’s possible to use freight cycling” (C1).

“Cycle logistics. Yeah. But the more people we are in Copenhagen, the more we consume of milk and... Of course there are... The more people we are, the more trucks to the supermarket. But we just have to rearrange them.. The day and the night times” (C2).

T2 states that the system perspective competence needs to be reflected in the municipal administrative structure, making it easier to take on a cross-sectorial approach:

“Well, there are a number of topics that challenge the traditional structure of an urban administration and that need a more holistically cross-sectorial approach. But transformation of the urban administration is on going and far from completed. And of course it is dynamic that will keep changing but still it lacks behind” (T2).

G2 is on the same track, stating:

“We work – I think we work too much in pipelines, simply. Generally. We would need to work more in the gutters. Collaboration and coordination.” (G2).

In other words, the competence of analysing and managing freight from a systems perspective means that the whole traffic system needs to be looked upon from a holistic perspective, where also the internal system of freight transportation needs to be understood. Additionally, the traditional municipal structure makes it more difficult for the freight transport management practice to apply a systems perspective. Here, a more cross-sectorial approach that is characterised by collaboration between the pipeline sectors would facilitate the application of a systems perspective.

6.3.2. Understanding the private sector

The private sector is a key cooperation partner for all the three cities, where they all have formed partnerships with private enterprises within logistics. Turku has recently formed a consolidation centre project consisting of a consolidation centre outside the city centre where private logistics companies are included. These companies are *“delivering packages with bicycles and electric cars and any kind of CO₂ free devices”* (T2). In addition, Turku has *“a place where the companies can keep their bicycles and load amount”* (T2). T2 elaborates:

“Companies can bring their bicycles and those in that space, and they can keep them, like, overnight. They don’t have to make those recycles back to the terminals. They can keep those in the city. And service and load batteries” (T2).

In this bicycle terminal example, the city needs to have knowledge about the needs, wants, and barriers for the private companies. Otherwise, the project might be formed in a way that does not suit the private enterprises. Copenhagen has *“put up a quality freight network”* (C2) which have *“between 30 and 50 members”* (C2) mainly consisting of *“companies, organisations, authorities, other municipalities”* (C2) and where *“all issues around freight in the city”* (C2) is discussed. C2 elaborates that this kind of network is valuable for the city as the city’s knowledge regarding the companies’ situation then increases. In other words, understanding the companies’ perspective becomes important within the freight transport management practice:

“I think authorities and other municipalities, when you meet with people actually using the city, you have another perspective. It’s... I think it’s really necessary to go into dialogue with the users of the city to understand their needs and their... To understand their difficulties as well” (C2).

Gothenburg has a similar freight network and states that *“there is no other platform where the private enterprises meet public authority regarding freight”* (G1). Gothenburg explicitly mentions that knowledge regarding the private enterprises’ situation is crucial when managing freight:

“And then that knowledge, to meet the private enterprises from a, sort of, from several dimensions... You need to have knowledge about what mechanisms that drives the private companies” (G1).

“And understanding for what resources the authority has and what resources the private enterprises have. You need to keep track on both. And very few has that knowledge, because you need to have worked within both sectors to lead that type of work” (G1).

In this last quotation, G1 highlights that it is beneficial for the municipal freight transport management practice if the people participating in the practice have worked at a private company before. This since the people then understand the mechanisms that steer the private enterprises.

6.3.3. Cooperation

All cities work in different partnerships and cooperate regarding the freight transportation flows. All three cities work with some type of consolidation centre outside the city, which facilitates the co-loading and can increase the loading rate of the freight vehicles. Light weight vehicles as, for example, electric trucks and electric cargo bikes deliver the goods from the consolidation centre to the city centre. In this project, the city works in partnership with other organisations and companies.

Both Gothenburg and Copenhagen have established a freight network consisting of different stakeholders, where freight related issues are discussed. As G1 elaborates on, this freight network is valuable in order to find solutions and reach consensus:

“The freight network? Yes... It’s a very solution-oriented forum, so to speak. Have been established for 12 years. Around 30 people, 8-9 different interest groups but in total 30 people. All stakeholders that are connected to a distribution chain are included; property owners, branch organisations, freight suppliers, academia, authorities [...] As I said, very solution-oriented. We lift problems but the thought is not to put down the problem again, but to discuss it until it’s solved. So, we don’t put it back and let it become worse, but we try to find a way forward” (G1).

“It’s about reaching consensus. You reach consensus regarding what’s important when you cooperate, collaborate, and to sort of find solutions to the uprising problems” (G1).

C2 is on the same track. When asked what they hope to achieve through the freight network, C2 answers:

“The common goals that we have. Because more and more companies right now are setting up or putting up really ambitious goals for CO₂ reduction, as well. They want to be CO₂ neutral companies. I think this... And then we can work together! Achieving their goals and our goals. It’s going to be common goals” (C2).

C2 highlights a result from the freight network:

“But I think that if we didn’t put up the freight network, we wouldn’t have now the guideline for off hour delivery. So, I think, you can see, cooperation matters” (T2).

In other words, cooperation is an important feature of the freight transport management practice as it is a way to gain understanding, reach common goals, and find joint solutions. Hence, the competence of being cooperative is needed within the freight transport management practice. T2 highlights this explicitly:

“It’s important that we have people who are competent in those cooperations. They have to be cooperation competent” (T2).

6.3.4. Seek and manage funding

Funding is identified as a material needed for the freight transport management practice. As a consequence, it becomes important for the practitioners to have knowledge in how to seek and manage funding. Otherwise, the funding might not be received or might be taken away. As T1 phrases it:

“And also, I have a lot of administration work with, because we get our money from EU so we have to report a lot. And stuff like that. So, a lot of my amount of time goes to the reporting and administration work” (T1).

6.3.5. Transport planning

All cities mention that transport planning is included in the freight managing practice. For instance, transport planning can be used to plan where, on which roads and which routes, the freight transportation should be:

“Well, some of those problem has already been addressed as new routes have been assigned for heavier transports which are outside the denser areas of the city” (T2).

“If we remove a bridge, there’s no self-fulfilling goal in having a bridge that makes car and freight transportation increase. If we remove that... Okey, we can have as ambition level to remove the cars. But okey, the freight, which is a prioritised transport mode, need to drive over the bridge. If we remove it, then we need to make sure that we help solving another way” (G1)

In addition, the transport planning can decide on details regarding, for example, how fast the freight drivers drive:

“In our department, we worked in a EU project called C Mobile, which is promoting what we call green catch where road sight equipment communicate directly with their non-port unit in trucks. So, we can advise the driver in the truck to have the suitable speed to arrive at the next intersection” (C1).

Through transport planning, the time when freight transportation is taking place can also be decided. Both G1 and C2 mentions that they work with night distribution in their respective city. To plan the deliveries during night using light weight and silent vehicles can here help to *“get a lower traffic load and increase traffic security” (G1)*. G1 also mentions that Gothenburg works with trying to plan some deliveries using urban water ways, as a way to *“relieve existing infrastructure. And in addition get a greater energy efficiency” (G1)*. This since *“the energy consumption is not the same if you drive the same amount of freight using water ways as when you drive the same amount of freight using road ” (G1)*.

In order to be able to implement these types of measures, knowledge and skills regarding transport planning is required. Because of this, transport planning is seen as a competence within the freight transport management practice.

6.3.6. Procurement and planning of the own municipal freight transportation

All three cities mention that they work with reducing the number of their own municipal deliveries or trying to making them more sustainable. Hence, a competence in the practice is to have knowledge on how the own municipal freight transportation can be managed. The procurement process is here highlighted as significant:

“We work with requirements on how the freight transportation will happen. [...] If we own the last bit of the transport, we can decide on our own if it should be electric trucks, for example or if the delivery should be done with cargo bikes or how the last bit should take place. And that the deliveries to every place become more effective, so that not every school, for example, get different deliveries every day from different places. That is just as much a congestion and risk and management and so issue, as an environmental issue, I think. And that you then set requirements on how. That is done by purchasing and procurement at our place, because it is they who make all such agreements. All purchasing agreements.” (G2).

“We can look at our own tender process and we can try make reduce some of our own, when we buy something. And we can consolidate the goods. But it’s really difficult to go out to the bigger companies and try and tell them to reduce the number of trucks that they have in the city” (C1).

“In our own activities, of course we try to reduce the need for mobility. For instance, those logistics where the city or city subsidiaries are involved we have had already for over decade or more, a policy or strategy to rationalize these logistics as much as possible. And to do that as effectively as possible and to reduce the amount of transport needed. So that we actually have, in our own activities” (T2).

“And I know that purchasing and procurement work with reducing the transportation when we do procurements on products and services... Actually, it’s perhaps not about reducing the amount of what we order, but about transporting it more effectively.” (G2).

In all of these quotations, the internal municipal deliveries are highlighted as deliveries that the municipality can affect and steer. The internal municipal deliveries offer a possibility for the municipality to directly manage the environmental impact from this type of freight transportation. The role of the purchasing and procurement department is highlighted as the requirements they set during procurement affect the way in which the freight is transported. Hence, knowledge and skills on what requirements to set when procuring freight transport is needed in the freight transport management practice.

6.4. Not decreasing the need for freight transportation

When putting the identified elements in relation to the sustainable mobility paradigm, it was identified that none of the cities work directly with trying to reduce the need for freight transporting vehicles. Both Gothenburg's and Copenhagen's transport strategy assumes that their populations will grow and states that this is perceived as one of the main challenges for the transportation system. In addition, the growing population will affect the freight transportation as "*More residents, visitors and activities means more goods transport, distribution and other utility traffic needing priority*" (Göteborgs stad, 2014, p. 38). The assumptions that the number of residents, workers, and visitors will increase and that this will lead to an increase in freight transportation flow are accepted throughout the transport strategies. Other possible future scenarios or measures implemented to change this assumed future are not mentioned. Additionally, the cities do not seem to include the work with trying to reduce the need for goods and goods transportation in the freight transport management practice. As T2 states:

"It's not a direct objective as reducing the need for transport and commuting and mobility" (T2).

T1 is on the same track and states that "*No, I don't think that's possible*", when asked if they try to reduce the need for goods transportation. When asked how Gothenburg work to make sure that the freight transportation does not increase, G1 answers "*Nothing!*".

Both G2 and T2 states that there is ongoing work in the municipality to affect the general public's consumption patterns to be more sustainable but that this work is not connected to the management of freight transportation. As T2 phrases it:

"We have activities and projects and information and participation at work for sustainable consumption annually and we have not really directly, in a systematic way, connected the consumption matters and their impacts on logistics. In principal, yes. But on a more analysed systematic way, no." (T2).

G2 is on the same track, stating:

"One of the measures that we have in both Fossil Free Gothenburg and the climate strategy and the environmental program is to inform and educate and affect consumers regarding what environmental impacts the activities in their everyday life has. But we don't work from that perspective here at the traffic office, towards the general public. Not with freight transportation. But we do that regarding cars! To reduce the number of travels done by car is one focus area. By travelling in a different way" (G2).

These two quotations point at that the need steering the freight transportation is not connected to the freight transport management practice. In the quotation by G2, it is highlighted that the traffic office has done this analysis regarding passenger transportation, where the city explicitly try to

decrease the need for car travels by offering different ways of travelling. When comparing the municipality's role in passenger transportation and freight transportation, G2 says:

“But I’m thinking that we do it regarding passenger transport and not regarding freight because our role is stronger on the passenger transport side. We have to offer people other ways to travel. As the traffic office, we have a difficulty to influence that they should travel. That you should not go on vacation and that you should not travel to work every day. That we can’t impact. But we can affect how people travel, there we have a possibility to offer good public transport and good bike routes [...] But with freight... I’m thinking that we have smaller opportunities to impact what people order, but if so how it is transported.” (G2).

Gothenburg here states that they, as a municipality, cannot influence what people order but rather in what way the deliveries are transported. Making the freight transportation happen in a more environmentally friendly way is here in focus. Copenhagen seem to highlight a similar angle; they are looking into the load factor in order to make the deliveries more efficient and decrease the environmental impact. Thereby they can affect how the freight is delivered – but not what or how much.

“It’s really difficult to go out to the bigger companies and try and tell them to reduce the number of trucks that they have in the city. We are looking into the load factor We are going to look at the load factor as well and maybe we can rearrange something” (C2).

Also Turku says that they work with how deliveries are delivered – but not with reducing the need for them. T2 says that Turku has an ambition to be a logistics hub, which means that they want more freight transport flows drawn close to the city.

“But at the same time, the city and the urban area have an aspiration to have, actually, more logistics here and be part of this TEN-T core route, one of them in Europe. But part of this transport and logistics would be on rails, then. Which would reduce the environmental impact as compared to road” (T2).

“There’s also a goal for the region to be a transport hub and logistics hub and that’s probably not going to decrease the logistics within here. But in the larger picture it may provide more optimal possibilities for logistics than some other solutions. But that’s perhaps beyond my evaluation” (T2).

6.5. Adopted measures

Some of the measures that the cities have adopted in order to decrease the CO₂ emissions from freight transport are similar, whereas other differ. Table 6 present the measures that either one or both of the respondents from the city mention that the city have adopted. There can be more activities and measures going on in the cities regarding freight transportation and decreasing its climate change impact, but that was not mentioned during the interviews. Some measures are described here, whereas others are further addressed during the description of the freight transport management practice.

Table 6 The cities' adopted measures to reduce the CO₂ emissions from freight transportation

	Gothenburg	Copenhagen	Turku
Cargo bikes		X	X
Consolidation centre	X	X	X
Environmental zones	X	X	
Electric trucks	X	X	X
Freight network	X	X	
Municipal freight transport	X	X	X
Night deliveries	X	X	
Route planning	X	X	X
Urban water ways	X		

Copenhagen and Turku mention that they have cargo bikes that deliver goods in the denser city centers. For Turku, the implementation of electric cargo bikes was done in cooperation with private companies where the city of Turku offers the companies “*a place where the companies can keep their bike and load amount and charge them*” (T1). Copenhagen has a different situation where the market has taken a leading role:

“I think the market right now are ready to work towards bike logistics. And there’s several companies here in the city of Copenhagen that’s up and running [...] We didn’t do anything, actually. It’s the market!” (C2)

“Sometimes, you don’t have to get involved as a municipality. You just have to talk about it. But it’s also part of our density. We want to be the most, or the best, cycling city in the world. And I think that also attracts cycle logistics” (C2)

As shown in the last quotation, Copenhagen’s clear vision to become the world’s leading cycling city seem to have attracted the companies working with cycle logistics.

Gothenburg and Copenhagen run and are part of a freight network. As mentioned in more detail under the heading *6.3.4 Cooperation* these networks are forums where different stakeholders meet and discuss issues regarding freight transportation in the city. The network consists of both public

and private actors. Both Gothenburg and Copenhagen highlight that the networks help the city to understand the other stakeholders and to find solutions. Gothenburg highlights that a key feature of the network is that the individuals attending have mandate within their own organisation, so that the discussions and decisions are more productive. Turku do not seem to have a similar forum where stakeholders can meet and discuss the freight situation in the city.

Gothenburg is the only city that mention that they work with trying to shift some of the freight transportation from roads to the water ways that run through the city. This is a measure targeting both congestion and climate change impact.

All three cities seem to perceive their role in a similar way. When it comes to implementing measures, the cities highlight that they are not a regulator but rather an enabler which can provide real-life testing environments to other actors:

“The municipality is not an authority which regulates freight. But through dialogue we can influence” (C1).

“Where the city becomes a testing arena for others who wants to test smart solutions. We also gain from this [...] The offer is to test their new products or vehicles or whatever it might be in a real environment and to see how it works” (G2).

“So that private companies can test or do some testing in the authentic city environment. So, we are making that possible for private companies, as a city. That’s the main role of city in our project. But we are not going to solve all the problems, but we are making it possible for the private companies to solve the problems in cities” (T1).

In these quotations it is highlighted that the cities perceive themselves as a test arena and an enabler of improvements. It is not the city itself which steer and perform the actual improvement, rather this is done by private companies and the market. The city’s role is to enable and help the private companies perform the improvements.

7. Discussion

In this chapter, the results from the empirical material are put in relation to the literature and previous research from previous chapters. Social practice theory was used to structure the results and identify the elements within the practice of municipal freight transport management, but will not be used as a basis for the analysis or discussion. The study aims to reflect upon how the elements included in the practice of municipal freight transport management relate to the sustainable mobility paradigm and identify measures to decrease climate change impact and reach sustainable mobility. Hence, focus is on the sustainable mobility paradigm and how the results relate to the features of this new paradigm within transport management. Furthermore, a discussion on the cities' adopted measures and approach towards freight transportation is held.

7.1. The elements and the sustainable mobility paradigm

The results from the empirical material point at that the freight transport management practice include elements which are in line with the sustainable mobility paradigm, as described by Banister (2008) and EU (2013). According to the sustainable mobility paradigm, environmental and social aspects should be given consideration and be included in the analysis (Banister, 2008; EU, 2013). The results from this study show that all three cities state that a reason for engaging in the freight transport management practice is to reduce the environmental impacts and the negative social impacts deriving from freight transportation. In other words, environmental and social impacts are highlighted by the informants as meanings in the freight transport management practice. The inclusion of environmental and social aspects seem to be in line with the sustainable mobility paradigm. In the practice, these environmental and social aspects seem to be closely related as the documents and the respondents address them concomitantly. Several measures that are being implemented is thought to both enhance the environmental aspects, such as GHG pollution, and social aspects, such as noise pollution.

Even though reducing environmental and negative social impacts are identified as meanings within the practice, none of the respondents mention it as a necessary competence to have when managing the freight. To have the knowledge to analyse when and how environmental and social impacts occur is not stated as a competence by the respondents. According to the sustainable mobility paradigm, a multicriteria analysis should be applied on the transport system which includes environmental and social aspects (Banister, 2008). In order to be able to conduct a multicriteria analysis, competence in environmental and social becomes necessary. The empirical material in this study point at that environmental and social aspects are meanings within the freight transport management practice. However, environmental and social are not mentioned by the informants as needed competences. This seems to be a shortcoming of the practice where the cities need to strengthen their competence in environmental and social aspects regarding freight to be able to analyse the freight transportation's impact on these aspects and how the impacts can be minimised in the best way possible. Environmental and social competences can for example be included in the practice by educating practitioners or by inviting people with competence in environmental and social issues to the practice of freight transport management. By including environmental and social competences in the practice, cross-sectorial work is strengthened and pipeline work is

counteracted. This means that a holistic systems perspective also can be strengthened. Systems perspective is something that the respondents highlight as a needed competence when managing freight.

Further on, the interviewees express that a competence within the freight transport management practice is systems perspective. Meaning that the practitioners need to have the skills to analyse the freight transportation situation from a holistic perspective, including passenger transport and perspectives on what affects the freight transportation. The respondents highlight that a cross-sectorial approach within the municipal organization can strengthen the systems perspective competence. This is in line with the sustainable mobility paradigm as this empathises that transportation should be looked upon from a transdisciplinary and holistic perspective (Banister, 2008; Gammelgaard, 2015; Johansson, 2019). Kiba-Janiak (2017) and Lindholm & Behrends (2012) also mention that cities need to apply a holistic perspective on the traffic driving on the city's streets. Pedestrians, bikes, public transport, cars, and freight transport need to be looked upon together and managed as a system (Kiba-Janiak, 2017; Lindholm & Behrends, 2012). This is something that also the cities included in this study stress, especially G1 who explicitly mention that the freight and passenger transport need to be incorporated on a system level.

Collaboration and stakeholder involvement are perceived by the respondents as needed competences within the freight transport management practice. The cities included in this study cooperate with for instance private enterprises and academia in order to solve conflicts, understand each other, transfer knowledge, and find and test solutions. Stakeholder involvement and participation is included in the sustainable mobility paradigm as well. The traditional transport planning paradigm focuses on expert planning (Banister, 2008; EU, 2013). Both private enterprises and academia can be seen as experts in their field. The cities seem to collaborate with non-experts such as consumers and inhabitants to a lesser extent. It would be interesting to see if the freight transport management would change if the perspectives from private persons were included. To hear their thoughts on night deliveries, cargo bikes, and transporting freight on water ways could be valuable for the cities and gain the cities insight on how to manage these types of freight solutions in the best way possible. At the same time, collaboration with private persons regarding freight could enable a clearer way on how to work with the need for freight transportations from a municipal perspective.

The identified elements within the freight transport management practice can be used to open up a discussion regarding what measures that are needed and important to adapt. Measures can be implemented to strengthen the elements that are perceived as positive and beneficial. From the interviews with Gothenburg and Copenhagen, it seems like the freight network is contributing to at least three of the identified elements. The freight network offers the city possibilities to strengthen their competences in collaboration and understanding the private sector. In addition, the network seems to be able to contribute to the meaning of avoiding aim conflicts as it can increase the understanding among stakeholders. As highlighted by Cui et al. (2015), Gammelgaard (2015) and Lindholm (2012) the freight transport system includes several stakeholders which increase the complexity of the management of freight transport. Lindholm (2012) mentions that good

communication and involvement of stakeholders are important for measure implementation success. The results of this study are on the same line. The freight network is a forum where these stakeholders can meet and discuss different solutions. Depending on the solutions that derive from the discussions within the network, the network can also contribute to reducing the environmental impacts, reducing the negative social impacts, ensuring good ease of passage for freight transports, and strengthening the economy and creating jobs. Turku do not seem to have a freight network. Since both Gothenburg and Copenhagen are satisfied with the results of their networks and since the network can contribute to the strengthening of several elements within the practice, a recommendation to the city of Turku is to investigate if and how a freight network could be established in Turku.

As highlighted by Isaksson et al. (2017) and shown by Johansson (2019), the transport planning practice can include features that are in line with the sustainable mobility paradigm and, at the same time, it can include features that goes against this new paradigm and make the transition towards it more difficult. The results of this study show the same, as the freight transport management practice also seem to include features that are not in line with the sustainable mobility paradigm.

Respondents from both Gothenburg and Turku mention that the city arrange activities addressing sustainable consumption and lifestyle. However, these activities are not coordinated with the freight transport management practice. Even though it is these needs and wants that fundamentally steer the freight transport management, these needs and wants are not included in the practice. To compare, it is as if the need and want to travel would not be included in the management of passenger transport. As shown in the results, the cities expect the freight transportation to increase as the population increases. However, other sectors within the city seem to work towards another vision where the consumption is more sustainable and where the need for freight transport is decreasing. This can create a clash where one sector work towards managing and enabling more deliveries, whereas another sector work towards decreasing it. As stated by Vogel (2016), aim conflicts can here arise as the municipality implements contradictive targets and measures. It could be beneficial to integrate these two sectors within the city's organisation since they are connected in the reality and affect each other. For example, an analysis on how more sustainable consumption patterns would affect the freight transport system and how the freight transport system affects consumption patterns would be interesting to see. There might be features in how the freight is managed today that affects the consumption patterns in a negative way and that contradicts the work towards sustainable consumption. An integration of the need for goods in the freight transport management practice could highlight this.

7.2. The cities' adopted measures and approach towards freight transportation

The measures that the cities have adopted to reduce CO₂ emissions from freight transportation have similar examples within the literature. For instance, consolidation centers also exist in London (Browne et al., 2012), Paris (Zanni & Bristow, 2010), and in several cities in the Netherlands (Browne et al., 2012). The cities included in this study seem to perceive themselves as enablers, meaning that the measures they implement mostly should enable for private companies to perform improvements. The regulating feature of an authority seem to be less strong. Research by Lindholm (2012) and Lindholm & Behrends (2012) also point at that cities perceive the optimisation and improvements within freight transportation as business-driven.

The results show that the cities implement measures focusing on technological development, such as electric trucks and electric cargo bikes, and capacity enhancement, such as consolidation centers and night deliveries, in order to decrease the climate change impact. These measures put emphasis on that the current production and consumption levels should be the same or increase in the future. The focus is on transporting the same amount of goods in a less harmful way. This can, for example, be done with cleaner technology or by increasing the vehicles' load factor and in that way reduce the number of vehicles. No measure that target the consumption behavior steering the freight transportation seem to be included in the practice. The cities' implemented measures and proposed solutions are, in other words, not challenging the current societal structures of economic growth, consumption, and production. The measures are within and supports this paradigm.

The focus on technological solutions that lies within our current societal structures point at that the practice is placed within the approach of ecological modernisation. This since ecological modernisation is characterised by solutions that are within our societal structures and that focus on technological development and efficiency advancements. Measures within ecological modernisation seldom include behavioral and consumption changes (Vogel, 2016). As Chapman (2007) and Zanni & Bristow (2010) mention, approaches targeting human behaviour, consumption, and dematerialisation are needed within the transport sector. The focus is often on technological and logistical advancements (Chapman, 2007; Zanni & Bristow, 2010), as also the results of this study show. This can form a path-dependency where measures regarding behavioural change are disregarded (Schwanen et al., 2011). Here, it would be interesting to investigate how measures targeting consumption behavior could be included in the practice and what the practice would look like if features of green governmentality and the realisation that earth has a carrying capacity was implemented.

According to Johansson (2019) and Vogel (2016), radical change on a system level is needed if the Paris agreements target to keep the global average temperature well below 2.0°C increase compared to pre-industrial levels is to be met. Hickman et al. (2010) is on the same track, stating that trend-breaking strategies are needed in order to mitigate the CO₂ emissions from urban transport. Measures that rely on technological development and efficiency advancements do not seem to be trend breaking or within the scope of radical change as it supports the current societal structures of how we consume and produce products.

8. Concluding discussion and recommendations

This study's purpose was to investigate what the cities Gothenburg, Copenhagen, and Turku need in order to manage urban freight transport and what measures the cities have adapted to reduce the CO₂ emissions deriving from urban freight transport. The study aimed to reflect upon how the elements included in the practice of municipal freight transport management relate to the sustainable mobility paradigm and identify measures to decrease climate change impact and reach sustainable mobility. The research question guiding the study was the following *How are the elements included in the practice of municipal freight transport management related to the sustainable mobility paradigm and what further types of measures can be adopted to decrease climate change impact and reach sustainable mobility?*

The results of this study show that the way Gothenburg, Copenhagen, and Turku manage freight transportation is both in line with the sustainable mobility paradigm and include features that contradicts this new paradigm. The results show that the reasons for managing freight is to reduce environmental and negative social impacts, ensure good ease of passage for freight transportation, strengthen the economy and create jobs, and avoid conflicting goals and find joint solutions. Needed materials are funding, guidelines, and personnel resources. Needed competences include taking a systems perspective, understanding the private sector, engaging in cooperation, seeking and managing funding, transport planning, and procurement and planning of the own municipal freight transportation. The need and behaviour which steers the freight transportation seem to be excluded from the freight transport management practice. This is the need for goods and behaviour of consumption. The cities' adapted measures to reduce the climate change impact from freight transportation focus on technological and logistical improvements.

Since both Gothenburg and Copenhagen are satisfied with the results of their freight networks and since the network can contribute to the strengthening of several elements within the practice, a recommendation to the city of Turku is to investigate if and how a freight network could be established in Turku. In addition, the cities need to strengthen their competence in environmental and social aspects regarding freight in order to be able to analyse the freight transportation's impact on these aspects and how the impact can be minimised in the best way possible. By including environmental and social competences in the practice, cross-sectorial work is strengthened and pipeline work is counteracted. This means that a holistic systems perspective also can be strengthened. Systems perspective is something that the respondents highlight as a needed competence when managing freight. In addition, it would be interesting to broaden the scope of who the city collaborates with. The perspectives from experts is in focus where the cities collaborate less with private persons. To hear their thoughts on freight transportation and adopted measures could be valuable for the cities and gain the cities insight on how to manage freight in the best way possible.

This study focuses on three cities' perspective. The freight transport system includes more stakeholders whose perspectives and thoughts are not included in this result. In order to get a holistic picture on the freight transportation system and how to reduce its CO₂ emissions, other stakeholders' perceptions are needed. For instance, it would be interesting to investigate private enterprises', national authorities', and inhabitants' perspectives. This is something that future research could investigate.

It would be interesting to investigate how measures targeting consumption behavior could be included in the management of freight transportation. This is something that future research could look more into. For example, an analysis on how more sustainable consumption patterns would affect the freight transport system and how the freight transport system affects consumption patterns would be interesting to see. There might be features in how the freight is managed today that affects the consumption patterns in a negative way and that contradicts the work towards sustainable consumption. It is recommended to integrate the need and demand for goods in the freight transport management practice as this need fundamentally steer the freight transportation. Integrating this need in the freight transport management could decrease the climate change impact from freight transport and bring freight transport management closer to the sustainable mobility paradigm.

9. References

2030-sekretariatet (2019). *Om 2030-sekretariatet*. [Online]

Available at: <https://2030-sekretariatet.se/om/>

[Accessed 2019-01-28]

Adams, W. C (2015). Conducting semi-structured interviews. In Newcomer, K. E., Hatry, H. P. & Wholey, J. S. (eds.) *Handbook of Practical Programme Evaluation*. New Jersey: John Wiley & Sons.

Allen, M.R., Dube, O.P., Solecki, W., Aragón-Durand, F., Cramer, W., Humphreys, S., Kainuma, M., Kala, J., Mahowald, N., Mulugetta, Y., Perez, Wairiu, M. & Zickfeld, K. (2018). Framing and Context. In: Masson-Delmotte, V., Zhai, P., Pörtner, H.-O., Roberts, D., Skea, J., Shukla, P.R., Pirani, A., Moufouma-Okia, W., Péan, C., Pidcock, R., Connors, S., Matthews, J.B.R., Chen, Y., Zhou, X., Gomis, M.I., Lonnoy, E., Maycock, T., Tignor, M. and Waterfield T. (eds.), *Global Warming of 1.5°C. An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty*.

Available at:

https://www.ipcc.ch/site/assets/uploads/sites/2/2019/02/SR15_Chapter1_Low_Res.pdf

[Accessed 2019-02-28]

Banister, D. (2008). The sustainable mobility paradigm. *Transport Policy*, 15, pp. 73–80.

Banister, D., Schwanen, T. & Anable, J. (2012). Introduction to the special section on theoretical perspectives on climate change mitigation in transport. *Journal of Transport Geography*, 24, pp.467–470.

Barriball, K. L. & While, A. (1994). Collecting Data Using a Semi-Structured Interview: a Discussion Paper. *Journal of Advanced Nursing*, 19, pp. 328-335.

Bergström, G. & Boréus, K. (2000). *Textens mening och makt – metodbok i samhällsvetenskaplig text- och diskursanalys*. Lund: Studentlitteratur AB.

Birtchnell, T. (2012). Elites, elements and events: Practice theory and scale. *Journal of Transport Geography*, 24, pp. 497-502.

Bowen, G. (2009). Document Analysis as a Qualitative Research Method. *Qualitative research journal*, 9(2), pp. 27-40.

- Browne, M., Allen, J., Nemoto, T., Patier, D. & Visser, J. (2012). Reducing social and environmental impacts of urban freight transport: A review of some major cities. *Procedia - Social and Behavioural Sciences*, 39, pp. 19–33.
- Bryman, A. (2008). *Social research methods*. 3^{ed}. Oxford: Oxford University Press.
- Chapman, L. (2007). Transport and climate change: a review. *Journal of Transport Geography*, 15, pp. 354–367.
- City of Copenhagen (2019). *The CPH 2025 Climate Plan*. [Online]
Available at: <https://urbandevolucioncph.kk.dk/artikel/cph-2025-climate-plan>
[Accessed 2019-05-02]
- City of Gothenburg (2014). *Gothenburg 2035 – Transport Strategy for a Close-Knit -City*.
Available at: https://goteborg.se/wps/wcm/connect/6c603463-f0b8-4fc9-9cd4-c1e934b41969/Trafikstrategi_eng_140821_web.pdf?MOD=AJPERES
[Accessed 2019-03-06]
- City of Turku (2018). *Turku's new climate plan to the global forefront*. [Online]
Available at: https://www.turku.fi/en/news/2018-06-08_turkus-new-climate-plan-global-forefront
[Accessed 2019-05-02]
- City of Turku (2019). *Turku info*. [Online]
Available at: <https://www.turku.fi/en/turku-info>
[Accessed 2019-01-31]
- Creswell, J. W. (2014). *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches*. (Fourth (International Student Edition)). London: SAGE Publications.
- Cui, J., Dodson, J. & Hall, P. V. (2015). Planning for Urban Freight Transport: An Overview. *Transport Reviews*, 35(5), pp. 583-598.
- Dalen, M. (2015). *Intervju som metod*. 2nd edition. Malmö: Gleerups.
- Danish Energy Agency (2019). *Danish Climate Policies*. [Online]
Available at: <https://ens.dk/en/our-responsibilities/energy-climate-politics/danish-climate-policies>
[Accessed 2019-01-28]
- Doody, O. & Noonan, M. (2013). Preparing and Conducting Interviews to Collect Data. *Nurse Researcher*, 20(5), pp. 28-32.

EU (2013). *Guidelines – Developing and implementing a sustainable urban mobility plan*. Available at: http://www.eltis.org/sites/default/files/guidelines-developing-and-implementing-a-sump_final_web_jan2014b.pdf [Accessed 2019-01-28]

EU (2019). *Transport emissions*. [Online] Available at: https://ec.europa.eu/clima/policies/transport_en [Accessed 2019-01-28]

Feldman, M.S. & Orlikowski, W.J. (2011). Theorizing Practice and Practicing Theory. *Organization Science*, 22(5), pp. 1240-1253.

Finnish government (2018). *Transport emissions to zero by 2045*. Available at: https://valtioneuvosto.fi/en/article/-/asset_publisher/liikenteen-paastot-nollaan-vuoteen-2045-mennessa [Accessed 2019-01-28]

FORS (2019). *LoCITY Driving*. [Online] Available at: <https://www.fors-online.org.uk/cms/locity-driving/> [Accessed 2019-01-25]

Gammelgaard, B. (2015). The emergence of city logistics: the case of Copenhagen's Citylogistik-kbh. *International Journal of Physical Distribution & Logistics Management*, 45(4), pp. 333-351.

Gill, P., Stewart, K., Treasue, E. & Chadwick, B. (2008). Methods of Data Collection in Qualitative Research: Interviews and Focus Groups, *British Dental Journal*, 204:6, p. 291-295.

Göteborg & Co (2019). *Our approach to sustainability*. [Online] Available at: <https://www.goteborg.com/en/convention-bureau/sustainability/our-approach-to-sustainability/> [Accessed 2019-05-02]

Göteborg stad (2018). *Göteborgs befolkningsutveckling*. [Online] Available at: https://goteborg.se/wps/portal/enhetssida/statistik-och-analys/aktuelltarkiv/aktuelltida/34ea2082-b06e-4e78-be4d-ef6265217cc9!/ut/p/z1/1ZFbB4JAEIV_0WZml90Fj2AtiCjFhtbdS7PgQkkrGKMm7a_vJh6aHhQ7t0nmm3nvDWjYgO7NuWvNsRt68-16peUbZzHSINNFHs8IFsF8EohF4knB4PXmQCJA38M_0YeQcjeACX3EsJjJfD3jiNlt3q2_8PinQozWLPIQ45yN8S-gIldfaXYaCtCg93W3BeVxaxgGjFQoLeHWD0hl-ZbYRjKnmvp1PRmxLi6n8UqFCMrx_IU-Q3j-p6B0LGz3TXZYTpetW2uO76TrmwE295md_qZEYb8ry_KjEs1qRXT11f4AGbkdDQ!!/dz/d5/L2dBISEvZ0FBIS9nQSEh/ [Accessed 2019-01-31]

Göteborg stad (2019). *Kommunen i siffror*. [Online]
Available at: https://goteborg.se/wps/portal/enhetssida/statistik-och-analys/goteborgsbladet/hamta-statistik/kommunen-i-siffror!/ut/p/z1/04_Sj9CPykssy0xPLMnMz0vMAfljo8ziTYzcDQy9TAy9DQzNLA0CvY2CLEK9_Y08jM31w8EKAgx dHA1NQAo8DN0MHANdzfyDXE0MDHxM9aOI0W-AAhwNnIKMnIwNDNz9jYjTj0dBFIbxyBbpF-SGhoY6KioCAKn4_MI!/dz/d5/L2dBISEvZ0FBIS9nQSEh/
[Accessed 2019-01-31]

Halkier, B. & Jensen, I. (2011). Methodological challenges in using practice theory in consumption research - examples from a study on handling nutritional contestations of food consumption. *Journal of Consumer Culture*, 11(1), pp. 101-123.

Hickman, R., Ashiru, O. & Banister, D. (2010). Transport and climate change: Simulating the options for carbon reduction in London. *Transport Policy*, 17, pp. 110–125.

Holguín-Veras, J., Encarnación, T., Fonález-Calderón, C. A., Winebrake, J., Wang, C., Kyle, S., Herazo-Padilla, N., Kalahasthi, L., Adarme, W., Cantillo, V., Yoshizaki, H. & Garrido, R. (2018). Direct impacts of off-hour deliveries on urban freight emissions. *Transport Research*, 61, pp. 84-103.

IPCC (2007). *The IPCC Fourth Assessment Report on Climate Change – Synthesis Report*. ICPP, Geneva.
Available at: https://www.ipcc.ch/site/assets/uploads/2018/02/ar4_syr_full_report.pdf
[Accessed 2019-03-06]

IPCC (2014). *Climate Change 2014: Mitigation of Climate Change. Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*. Edenhofer, O., Pichs-Madruca, R., Sokona, Y., Farahani, E., Kadner, S., Seyboth, K., Adler, A., Baum, I., Brunner, S., Eickemeier, P., Kriemann, B., Savolainen, J., Schlömer, S., von Stechow, C., Zwickel, T. & J.C. Minx, J.C. (eds.). Cambridge and New York: Cambridge University Press.
Available at: https://www.ipcc.ch/site/assets/uploads/2018/02/ipcc_wg3_ar5_full.pdf
[Accessed 2019-03-06]

Isaksson, K., Antonson, H. & Eriksson, L. (2017). Layering and parallel policy making – Complementary concepts for understanding implementation challenges related to sustainable mobility. *Transport Policy*, 53, pp. 50-57.

Johansson, F. (2019). *Towards a sustainable mobility paradigm? An assessment of three policy measures*. Licentiate Thesis. KTH Royal Institute of Technology, School of Architecture and the Built Environment Department of Sustainable Development, Environmental Science and Engineering Division of Strategic Sustainability Studies.

Available at: <http://kth.diva-portal.org/smash/get/diva2:1273853/FULLTEXT01.pdf>

[Accessed 2019-02-27]

Kennedy, E. H., Cohen M. J., Krogman N. T., (2015). Social practice theories and research on sustainable consumption. In Kennedy, E. H., Cohen M. J., Krogman N. T., (eds.) *Putting Sustainability into Practice. Applications and Advances in Research on Sustainable Consumption*. Edward Elgar Publishing.

Kiba-Janiak, M. (2017). Urban freight transport in city strategic planning. *Research in Transportation and Management*, 24, pp. 4-16.

Kuhn, T. S. (1970). *De vetenskapliga revolutionernas struktur*. Stockholm: Thales.

Københavns kommune (2012). *Handlingsplan for grøn mobilitet*.

Available at: https://kk.sites.itera.dk/apps/kk_pub2/pdf/1020_TcrFN1CpXx.pdf

[Accessed 2019-03-04]

Larkin, A., Kuriakose, J., Sharmina, M. & Anderson, K. (2018). What if negative emission technologies fail at scale? Implications of the Paris Agreement for big emitting nations, *Climate Policy*, 18(6), pp. 690–714.

Lechuga, V. M. (2012). Exploring culture from a distance: the utility of telephone interviews in qualitative research. *International Journal of Qualitative Studies in Education*. 25(3), pp. 251-268.

Liimatainen, H., Arvidsson, N., Hovi, B. I., Jensen, T. C., Nykänen, H. (2014). Road freight energy efficiency and CO2 emissions in the Nordic countries. *Research in Transportation Business & Management*, 12, pp. 11-19.

Lindholm, M. (2012). How local authority decision makers address freight transport in the urban area. *Procedia - Social and Behavioral Sciences*, 39, pp. 134 – 145.

Lindholm, M. & Behrends, S. (2012). Challenges in urban freight transport planning – a review in the Baltic Sea Region. *Journal of Transport Geography*, 22, pp. 129-136.

Lundberg, C. (2013). Eutrophication, Risk Management and Sustainability - The Perceptions of Different Stakeholders in the Northern Baltic Sea. *Marine Pollution Bulletin*, 66(1-2), pp. 143-150.

Marjomaa, J. (2017). *Nu blir Göteborg en miljon*. SVT. [Online]
Available at: <https://www.svt.se/nyheter/lokalt/vast/nu-blir-goteborg-en-miljon?>
[Accessed 2019-01-31]

Marshall, S. L. & While, A. E. (1994). Interviewing respondents who have English as a second language: challenges encountered and suggestions for other researchers. *Journal of Advanced Nursing*, 19, pp. 556-571.

McNamara, C. (2009). *General guidelines for conducting interviews*. [Online]
Available at: <http://managementhelp.org/evaluatn/intrview.htm>
[Accessed 2019-02-04]

NASA (2019). *Graphic: The relentless rise of carbon dioxide*. [Online]
Available at: https://climate.nasa.gov/climate_resources/24/graphic-the-relentless-rise-of-carbon-dioxide/
[Accessed 2019-02-11]

NE (2018a). *Göteborg*. [Online]
Available at: <https://www.ne.se/uppslagsverk/encyklopedi/l%C3%A5ng/g%C3%B6teborg>
[Accessed 2019-01-31]

NE (2018b). *Köpenhamn*. [Online]
Available at: <https://www.ne.se/uppslagsverk/encyklopedi/l%C3%A5ng/k%C3%B6penhamn>
[Accessed 2019-01-31]

NE (2018c). *Åbo*. [Online]
Available at: <https://www.ne.se/uppslagsverk/encyklopedi/l%C3%A5ng/%C3%A5bo>
[Accessed 2019-01-31]

O’Leary, Z. (2014). *The essential guide to doing your research project*. 2nd edition. SAGE: London.

Oldensjö, E. (2018). *The Practice of Influencing – How Zero Waste YouTubers Try to Influence the Reduction of Waste Through Online Communities*. Master’s thesis. Swedish University of Agricultural Sciences. Uppsala.

Owen, G. T. (2014). Qualitative Methods in Higher Education Policy Analysis: Using Interviews and Document Analysis. *The Qualitative Report*, 19(26), pp. 1-19.

Reckwitz, A. (2002). Toward a theory of social practices: a development in culturalist theorizing. *European Journal of Social Theory*, 5(2), pp. 243–263.

Rockström, J., Gaffney, O., Rogelj, J., Meinshausen, M., Nakicenovic, N. & Schellnhuber, H. J. (2017). A Roadmap for Rapid Decarbonization, *Science*, 355(6331), pp. 1269–1271.

Robertson, K. (2015). *Comparison of the EU's Sustainable urban mobility plan (SUMP) and the Swedish planning support Transport for an attractive city (TRAST)*.

Available at: <http://vti.diva-portal.org/smash/get/diva2:856558/FULLTEXT01.pdf>

[Accessed 2019-01-28]

Ryan, G., W. & Russel Bernard, H. (2003). Techniques to Identify Themes. *Field Methods*, 15(1), pp. 85–109.

Schwanen, T., Banister, D. & Anable, J. (2011). Scientific research about climate change mitigation in transportation: A critical review. *Transportation research*, 45, pp. 993-1006.

Shove, E., Pantzar, M., Watson, M. (2012). *The Dynamics of Social Practice, Everyday Life and How it changes*. London: Sage.

Stelling, P. (2014). Policy instruments for reducing CO₂-emissions from the Swedish freight transport sector. *Research in Transportation and Business Management*, 12, pp. 47-54.

Sveriges regering (2017). *Det klimatpolitiska ramverket*. [Online]

Available at: <https://www.regeringen.se/artiklar/2017/06/det-klimatpolitiska-ramverket/>

[2019-05-02]

Turner, D. W. (2010). Qualitative Interview Design: a Practical Guide for Novice Investigators. *The Qualitative Report*, 15(3), pp. 754-760.

Vital Nodes (2019). *Efficient, sustainable freight delivery across urban areas*. [Online]

Available at: <https://vitalnodes.eu/>

[Accessed 2019-01-21]

Vogel, N. (2016). Municipalities' ambitions and practices: At risk of hypocritical sustainability transitions? *Journal of Environmental Policy & Planning*, 18(3), pp. 361-378.

Watson, M. (2012). How theories of practice can inform transition to a decarbonised transport system. *Journal of Transport Geography*, 24, pp. 488–496.

Zanni, A. & Bristow, A. L. (2010). Emissions of CO₂ from road freight transport in London: Trends and policies for long run reductions. *Energy Policy*, 38, pp. 1774–1786.

Zhang, Y. & Wildemuth, B., M. (2009). Qualitative Analysis of Content. *Applications of Social Research Methods to Questions in Information and Library Science*, p. 308-319.

Appendix I – Information sheet

My name is Linnéa Lundström and I study environmental management at KTH Royal Institute of Technology. I am currently writing my master thesis in collaboration with the Swedish Transport Administration. The thesis is about how cities try to reduce the climate change impact from freight transport. I am interested in what you do at your work, and how you perceive goals conflicts and collaboration regarding freight transport. I am grateful that you have agreed to doing this interview.

The interview consists of about 15 questions. The main purpose is not to answer all questions. I might change the order of the questions depending on what we come in to during the interview. Please feel free to develop your answers as much as you are comfortable with. There are no right or wrong answers. If you can not or do not want to answer a question, we just skip that question and move on to the next one. You can finish the interview whenever you want to. I estimate that the interview will be about one hour. You will be anonymous in the thesis. I will not mention you by name.

In order to facilitate the analysis of the interview, I would like to record the interview. Would you be okay with this? I am the only one that will listen to the recording. When the thesis is finished and approved, I will delete the recording.

Thank you for doing this interview! Do you have any questions for me before we start?

Jag heter Linnéa Lundström och pluggar miljömanagement på KTH. Jag skriver just nu min masteruppsats i samarbete med Trafikverket, om hur städer arbetar med att minska klimatpåverkan från godstransporter. Jag är intresserad av vad du gör i vardagen här på ditt jobb, hur ni ser på målkonflikter och samverkan kopplat till godstransporter. Jag är väldigt glad att du tackat ja till denna intervju.

Intervjun innehåller ungefär 15 frågor. Huvudsaken är inte att alla frågorna får ett svar. Jag kanske kommer att ändra ordningen på frågorna beroende på vad som kommer upp. Känn dig fri att utveckla svaren på frågorna så mycket som du är bekväm med. Det finns inga rätta eller fel svar på frågorna jag ställer. Om du inte kan eller vill svara på en fråga, så är det bara att säga det – så skippar vi den. Tveka inte att fråga ifall det är något du undrar över eller inte förstår. Du kan avsluta intervjun när du vill. Jag beräknar att intervjun kommer ta cirka en timme. . I själva uppsatsen kommer du vara anonym. Jag kommer inte nämna dig vid namn.

För att underlätta bearbetningen av intervjun skulle jag vilja spela in intervjun. Skulle detta vara okej för dig? Jag är den ende personen som kommer lyssna på inspelningen. När uppsatsen är klar och inlämnad kommer ljudinspelningen att raderas.

Tack igen för att du ställer upp! Har du några frågor till mig innan vi drar igång?

Appendix II – Interview guide

Introduction

1. What is your role in the municipality? What do you work with?
 1. Areas of responsibilities?
 2. For how long have you worked here?

2. In what way are you working with transport?
 1. Are you working with both passenger transport and freight transport?
 2. Who are you closest colleges? What do they work with?
Areas of responsibilities?

3. What are you working with right now?
 1. Projects that are connected to freight transportation?
 2. Where are the projects supposed to lead? Goals? Purpose?
 3. Who are involved? Cooperation?
 4. Difficulties?
 5. Are there any goals conflicts in this project?
 6. What are you doing? Tools/programs?

Mobility strategy

5. Are you working with the Sustainable Urban Mobility Plan (SUMP) framework?
 1. If yes, how?
 2. Have your working tasks changed because of this?

Number of freight transporting vehicles

6. Do you work with trying to reduce the number of freight transporting vehicles?
 1. If yes, how?
 2. What is good with this way of working?
 3. What is less good?
 4. Who are involved in this kind of work?

Conflicting goals

8. How do you plan in order to avoid conflicting goal?
 1. What is good with this way of working?
 2. What is less good with this way of working?
 3. What competences are needed?
 4. What tools/materials are used?

9. When and how do goals conflicts arise?

10. What do you do when conflicting goals arise?
 1. How do you try to solve goals conflicts?
 2. What competences are needed?
 3. What tools/materials are used?

Cooperation

11. Why is cooperation concerning freight transport important?
 1. What do you hope to achieve through cooperation?

12. Which stakeholders/actors do you cooperate with concerning freight transportation?
 1. How do you try to solve goals conflicts?
 2. What tools/materials are used?
 3. Do you cooperate with private persons regarding freight transportation?

13. Concerning which questions regarding freight transportation are you cooperating?

Ending

Is there anything that you think I have missed to ask, that I should be asking?

Is there anything you would like to add or ask before we end this interview?

Introduktion

1. Vad är din roll inom kommunen? Vad jobbar du med?
 1. Ansvarsområden?
 2. Hur länge har du arbetat här?

2. På vilket sätt arbetar du med godstransporter?
 2. Arbetar du med både distributionstrafik och godstransporter?
 3. Vilka är dina närmaste kollegor? Vad jobbar de med? Deras ansvarsområden?

3. Vad jobbar du med just nu?
 2. Vad gör du i din vardag på jobbet? Arbetsuppgifter?
 3. Projekt som är igång kopplade till godstrafik?
 4. Var ska detta leda? Mål?
 5. Svårigheter?
 6. Finns det några målkonflikter i detta projekt?
 7. Vilka är involverade? Samverkan?
 8. Hur gör du? Vilka material/hjälpmedel använder du?

SUMP

Ni har skrivit en trafikstrategi som jag har läst.

4. Har du varit med och tagit fram den?

5. Har ni ändrat arbetssättet inom godstransporter för att leva upp till *SUMP*?
 1. Om ja, hur har arbetssättet ändrats? Bedriver ni andra typer av projekt?
 2. Finns det områden där arbetssättet inte ändrats?
 3. Behövs och används andra kompetenser/kunskaper/material/hjälpmedel? Vilka då?

Fyrstegsprincipen

6. Jobbar ni med fyrstegsprincipen angående godstrafik?
7. Hur jobbar ni med fyrstegsprincipens steg 1 angående godstrafik? Att minska behovet av godstrafik...?
 1. Vad är bra med detta sätt?
 2. Vad är mindre bra?
 3. Vilka är involverade i detta jobb? (avfall, delningsekonomi, produkter som håller längre etc)
 4. Alternativa sätt att jobba?
8. Hur kommer det sig att ni inte satt upp mål gällande att minska behovet av godstransporter?
 1. Godstransporter på väg ska inte öka från 2010 års nivåer för att kunna uppnå klimatmålen. Hur planerar ni för detta?
 2. Hur kan trafikarbetet gällande gods minska?
 3. Jobbar ni något med att öka lastningsgraden på transporter? Hur?

Målkonflikter

9. Hur planerar man för att undvika målkonflikter?
 1. Vad är bra med detta sätt?
 2. Vad är mindre bra?
 3. Vilka kompetenser behövs?
 4. Vilka material/hjälpmedel används?
10. När och hur brukar målkonflikter kopplat till godstransporter uppstå?
 1. Hur tänker man kring målkonflikter som kan uppstå i och med ökande befolkning, förtätning och mer godstransporter?
11. Vad gör man då en målkonflikt uppstått?
 1. Hur försöker man lösa målkonflikter?
 2. Vilka kompetenser behövs?
 3. Vilka material/hjälpmedel används?

Samverkan

12. Varför är samverkan gällande godstransporter viktigt?
 1. Vad hoppas man kunna uppnå genom samverkan?
13. Med vilka aktörer samverkar ni gällande godstransporter?
 1. Vilka kompetenser behövs för att möjliggöra god samverkan?
 2. Vilka material/hjälpmedel används?
 3. Samverkar man något med privatpersoner/boende?
14. Kring vilka frågor kopplade till godstransporter samverkar ni?

Avslut

Jag får tacka så mycket för att du ställde upp på denna intervju. Finns det något du vill lägga till eller fråga mig om innan vi avslutar?