

The role of influencing organisations in promoting sustainability of urban freight transport

Alena Brettmo



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

To my family

Doctoral dissertation in business administration, Department of Business Administration, School of Business, Economics and Law at University of Gothenburg, 7th December, 2021

Department of Business Administration
School of Business, Economics and Law
University of Gothenburg
PO Box 610
405 30 Göteborg
Sweden
www.fek.handels.gu.se

Cover photo by Jonas Jacobsson on Unsplash
Cover design: Malin Tengblad

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ISBN: 978-91-88623-23-2

Printed in Sweden by
Stema Specialtryck AB, Borås 2021



Abstract

The research in this thesis focused on organisations that can contribute to increased sustainability development in urban freight transport activities. In this study, these organisations were identified, studied, grouped together and labelled as *influencing organisations*. Four types of influencing organisations in urban freight transport were identified: Business Improvement Districts (BIDs), facility management companies, property owners and public procurement organisations. The results indicated that influencing organisations use a variety of measures and engage in a wide range of urban freight transport initiatives. The way that they engage depends on the types of organisations involved and the relationships the influencers had with said organisations.

The findings suggest that influencing organisations have certain characteristics, including: i) the ability to unite other actors, notably goods receivers (such as shops, offices, hotels, restaurants), ii) high motivation to engage in urban freight transport-related questions and sustainability, iii) possessing effective tools to promote sustainable measures, such as the capability to orchestrate and consolidate physical flows, leverage based on contractual relationships, administrative power, outreach power and serving as a common voice for establishments. This places them in a strong position to support the upscaling of sustainable urban freight transport initiatives and broaden the level of implementation.

This study paid attention to actors beyond those that are directly associated with urban freight supply chains (carriers, shippers, goods receivers and regulators) to increase the understanding of the role of these organisations in promoting sustainability improvements in urban freight transport activities. The in-depth analysis of the activities carried out by influencing organisations shows why it is important to include them within the scope of urban freight measures and policies: i) they help to overcome the inertia inhibiting the implementation of sustainable urban freight transport initiatives, and ii) they have a connection to many goods receivers as well

as the leverage to influence and possibly unite them. Moreover, influencers often have available resources to invest in new infrastructural solutions or processes and the motivation and incentives to carry out these initiatives, thus allowing this engagement to be beneficial both for them and the sustainable development of cities. The results of this thesis provide insights for policymakers about forming policies and regulations to stimulate the engagement of influencers in urban freight transport. This research illustrates to the influencing organisations themselves that they can play a valuable role in the future trajectory of urban freight transport development, as well as examples of ways to change urban freight transport to be more sustainable.

Keywords: urban freight transport, stakeholders, influencing organisations, sustainability, stakeholder engagement

Acknowledgements

There are many people to whom I would like to send my warmest thanks. I would like to express deep gratitude to my main supervisor, Michael Browne, who provided continuous support and guidance throughout this dissertation. I appreciate his devotion, patience, endless kindness, and of course, his tremendous expertise and the wisdom he shared with me; I do not take this for granted, and I am extremely grateful that he was my supervisor. I am also thankful for all the support and feedback provided by my co-supervisors, Laetitia Dablanc and Johan Woxenius, during this time and that they never stopped believing in me.

I would like to thank all of my colleagues in the IFEL section and everyone in the Business Administration Department, with special thanks to Jonas Flodén, Catrin Lamngård, Jon Williamsson, Rickard Bergqvist, Elisabeth Karlsson, Gabriela Schaad, Martha Gonzalez-Aregall, Sharon Cullinane and Kevin Cullinane. Additional thanks to Stefan Sjögren, Wiviann Hall, Kajsa Lundh, Malin Tengblad and Annika Pihl for helping me with PhD-related and administrative matters.

I would like to thank the researchers outside the University of Gothenburg with whom I met to present my research; I learned a lot from their feedback. Special thanks to José Holguin-Veras, Jeff Wojtowicz and their friendly research group at the Rensselaer Polytechnic Institute, Anne Goodchild and her research group of the University of Washington, Ivan Sanchez-Diaz, Klas Hedvall from Chalmers University of Technology, and many others.

I also would like to thank the Logistics and Transport Society (Logistik och Transport Stiftelsen LTS) that contributed to my employment funding as a doctoral student at Department of Business Administration at University of Gothenburg, as well as Volvo Research and Educational Foundations (VREF) urban freight initiative that has provided funding to the Urban Freight Platform (University of Gothenburg and Chalmers) and supported me with travel grants for several study visits and conferences.

I would like to acknowledge the contribution of the interviewees that participated in the interviews for data collection and shared their knowledge with me. Special thanks to Christoffer Widegren from Traffic

Agency (Trafikkontoret) in Gothenburg, Sweden and Magnus Zingmark from Nordstan shopping centre that supported my research in several occasions.

I would like to extend my heartfelt gratitude to my friends who supported me during this process, especially Bianca Koroschetz, Antonina Shypotilo and Anna Ustinenka, who encouraged and motivated me throughout this journey. I am lucky to have all of you in my life.

Last but not least, I would like to thank my parents, Natalia and Aleksandr, and my sister, Katja, and her family. And of course, it goes without saying, my most heartfelt thanks to my husband, Martin, and our children, Alicia and Sofia, for your support, encouragement and patience. I would not have been able to do this research without your love.

Alena Brettmo

Gothenburg, October 2021

List of papers

This dissertation is based on the following papers:

Paper I

Brettmo, A., & Williamsson, J. (2020). The Role of ‘Influencers’ as Drivers of a More Sustainable Urban Freight Sector. *Sustainability*, 12(7), 2850.

Paper II

Brettmo, A., & Browne, M. (2020). Business Improvement Districts as important influencers for changing to sustainable urban freight. *Cities*, 97, 102558.

Paper III

Brettmo, A., Sanchez-Diaz, I. (2021). Property Owners as Possible Game Changers for Sustainable Urban Freight Research. Revised and resubmitted to *Research in Transportation Business & Management*. Revised version is under review.

Paper IV

Brettmo, A. (2021). Longitudinal study on urban freight sustainability initiatives: Two cases from Sweden. Submitted to *Research in Transportation Economics*.

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1 Introduction

This chapter provides the background to the dissertation, the research problematisation and motivation and the introduction to the research topic. It also includes the purpose, research questions and outline of the thesis.

1.1 Background

The world is characterised by constant growth of population and urbanisation. More than half of the global population lives in cities today, and this figure is projected to reach 5 billion by 2050 (OECD/European Commission, 2020). The population living in cities¹ with more than 50,000 inhabitants has more than doubled over the last 40 years and, as a result, cities have grown rapidly (ibid). Cities are major centres of economic activity and innovation, as they generally offer a higher quality of life and stimulate economic development (OECD/European Commission, 2020). However, expanding urbanisations threatens the liveability of cities and brings negative impacts related to sustainability, since this is connected to constantly growing consumption rates and the need for the transport of goods. Cities heavily rely on diverse supplies; thus, urban freight transport (UFT) has become a highly important aspect of the viability of cities. While UFT is affected by a range of factors, urban infrastructure for goods transport and deliveries is critical for a reliable goods supply in cities. The increasing population density in many cities (OECD/European Commission, 2020) and the constraints of existing infrastructure impose additional pressure on UFT. Many cities are already challenged by traffic congestion, insufficient curb space for loading and unloading operations, traffic safety problems and a lack of parking space, all of which bring additional costs for individuals and significantly affect productivity and economic growth (ITF, 2010). Impeded transport has

¹ According to a newly established definition by the OECD, urbanisations must have a population of at least 50,000, exhibit a density of at least 1,500 inhabitants per km² or are at least 50% comprised of high-density clusters to be considered cities (OECD/European Commission, 2020)

been proven to slow down economic growth (Goodwin, 2004; Duranton & Turner, 2011).

Expanding urbanisations leads not only to social and infrastructural challenges in society, but it also adds to sustainability issues such as CO₂ emissions, which account for the greenhouse effect and threaten to bring severe climate changes at a global level (IPCC, 2014). According to the International Environmental Agency report (IEA, 2020), transport accounts for 24% of the direct CO₂ emissions from fuel combustion. The global transport demand for people and goods is expected to double by 2050 due to the growth in population and economic development (ITF, 2021). Freight accounts for more than 40% of transport emissions, and road transport is responsible for 65% of freight emissions (ITF, 2021). It is worth mentioning that most freight in cities is moved along roads (Allen et al., 2008; Allen et al., 2014; Dablanc, 2007).

Due to serious climate change issues, the European Commission has set a goal to reduce the CO₂ emissions produced by UFT. The objective is to establish zero CO₂ emission freight transport in major urban centres by 2030 (White paper, 2011; Horizon, 2020). Moreover, many of the drivers of CO₂ emissions are also sources of air pollution, which is especially concerning in urban areas. According to the World Health Organisation (WHO, 2019), ambient air pollution is a major environmental risk to health; air pollution causes such illnesses as heart disease, stroke, lung cancer and chronic respiratory diseases and it is accountable for around 4.2 million deaths per year. Moreover, in 2016, 91% of the world's population lived in places that did not meet WHO air quality standards. Fuel combustion from motor vehicles is one of the major sources of outdoor air pollution (WHO, 2019). According to current evidence, the most harmful pollutants for health impacts are particulate matter (PM), ozone (O₃), nitrogen dioxide (NO₂) and sulphur dioxide (SO₂) (ibid). Road transport accounts for up to 30% of PM in European cities and up to 50% of PM in OECD countries, mostly due to diesel traffic. Low- and middle-income countries are even more highly exposed to transport pollution, which accounts for up to 70% of total air pollution, particularly in Asia, Africa and the Middle East (WHO, 2019).

It is necessary to note that cities are affected by recent trends in business development, such as an increase in the range of goods and services provided to businesses, final consumers and organisations (B2B and B2C), and the rise of e-commerce (Holguín-Veras et al., 2019). There has been an expansion of home deliveries and a tremendous rise of express and instant delivery services. These tendencies have increased the intensity, diversity and fragmentation of the UFT sector (Dablanc et al., 2017). It also has led to increased demand for UFT, which has brought additional externalities connected to higher levels of goods transport, leading to increased complexity in UFT and compromising its sustainability.

To counter this, many projects have been initiated to promote more sustainable approaches to UFT. In many cases, there is a strong focus on technological solutions, such as the use of electrical or low-emission vehicles, cargo bikes, autonomous vehicles and drone deliveries. Another group of solutions focuses on changing delivery organisations, including unattended pickup points, crowd logistics solutions, consolidation and freight demand management programmes and so on (Holguín-Veras et al., 2015; BESTFACT, 2014; CIVITAS, 2021).

However, the widespread implementation of sustainable solutions has yet to happen. While this can be explained by a range of factors, the economic viability of various innovative solutions is a fundamental factor in this delay. In most market economies, private businesses are the driving force that can ensure the extension of recently developed transport solutions. Prior to implementing certain solutions in their operations, private businesses usually estimate the economic self-sufficiency and viability of these solutions and make decisions based on this evaluation. For example, many transport operators would like to be more sustainable and acquire electrical low-emissions vehicles for their operations. However, the acquisition costs of vehicles are extremely high and, thus, not economically viable, at least not without external subventions or financial support. Moreover, the use of electrical vehicles requires charging infrastructure to be available and accessible, which could be an additional constraint for vehicle operations. These rationales affect transport operators' decisions to acquire and use electrical vehicles and should be

taken into consideration when aiming to promote the use of electrical vehicles for transport services.

Due to the abovementioned aspects, strategies that aim to change the behaviour of businesses to promote a more sustainable UFT should be built on: i) understanding the business environment in which organisations operate; ii) understanding the rationales that are used during the decision-making process in organisations; and iii) providing policy framework that could affect both of the above in the form of economic incentives and regulations. Moreover, in many cases, businesses are unaware about how their business activities negatively impact sustainability in UFT. This is often the case for goods receivers, as they do not usually deal with transport and merely order and accept the goods required for their businesses. The starting point to change their behaviour would consist of finding ways to increase awareness from businesses about the externalities produced by extensive urban deliveries, including their own freight transport flows, and propose alternative and economically viable ways to implement such initiatives.

To sum up, cities and the demand for the movement of goods are both growing, putting pressure on the existing urban infrastructure and threatening the accessibility and goods supply in cities. A range of technological solutions have been proposed to diminish the effect produced by the externalities of goods deliveries, such as cleaner vehicles for goods deliveries and the use of freight demand management programmes. However, a wide-spread implementation of such solutions at the private business level has yet to happen, thus more changes should occur—behavioural changes in companies and individuals as well as changes in policies—to make a difference and reorganise the urban freight sector to meet the demands of the future.

1.2 Research problematisation

Short overview about research in urban freight

The definition of urban freight transport varies among researchers. In an early and important work, Ogden (1992) defined urban freight transport as "...the movement of things (as distinct from people) to, from within and, through urban areas" (p. 14). The OECD (2003) defines urban goods transport as "the delivery of consumer goods (not only by retail but also by other sectors such as manufacturing) in city and suburban areas, including the reverse flow of used goods in terms of clean waste" (p. 19). Taniguchi et al. (2001) defined city logistics as "... the process for totally optimising the logistics and transport activities by private companies in urban areas while considering the traffic environment, the traffic congestion and energy consumption within the framework of a market economy" (p. 2). Dablanc (2007, p. 3) defined urban freight transport as "the transport of goods carried out by or for professionals in an urban environment", which is the definition that was adopted for this thesis. Despite Taniguchi's definition of city logistics, which notes the importance of optimisations, the terms "urban freight" and "city logistics" have been used by many researchers as synonymous to *urban freight transport*. Discussing the specific research activities that make up this thesis the term *urban freight transport* has mostly been used.

Over time, the goals of research in urban freight transport have changed. Ogden (1992) named three main areas of focus in the field: contribution to economic development, freight efficiency and minimisation of adverse impacts. Today, these goals are as important as before, but they are usually gathered together under the umbrella term of sustainability in UFT. In a broad sense, sustainability includes three main aspects: environment, economy and society, also referred to as the Triple P—planet, people and profit. In the context of urban freight transport, Quak (2008) referred to these three aspects in the following way:

- Environmental impacts, or impacts on the planet: air pollution; the use of non-renewable natural resources; waste products.

- Social impacts, or impact on people: deterioration of public health caused by pollutant emissions; death and injuries caused by traffic accidents; increase in nuisances, reduction in air quality; and damage of buildings and infrastructure.
- Economic impacts, or impacts on profit: inefficiency and waste of resources; reduction of trip reliability and punctuality of deliveries, that can result in worsened service to customers and lost markets; slowdown in economic development; and congestion and decrease in city accessibility.

Therefore, in a general sense, many scholars in the field of UFT focus their research efforts on topics that could enhance different aspects of sustainability in UFT by using a range of research approaches and targeting various research objectives. Despite the range of approaches, it is possible to consider them under three broad categories that are briefly described below.

The first category is research built upon the quantitative analysis and statistical description of the freight flows and various kinds of modelling (Anand et al., 2012; Marcucci & Gatta, 2014; Holguín-Veras & Sánchez-Díaz, 2016; Muñuzuri et al., 2010; Nuzzolo et al., 2014; Russo & Comi, 2011; Sánchez-Díaz, 2017; Toilier et al., 2018). Different kinds of routing and scheduling problems and related modifications and optimisation modelling, including route and location optimisation, also fit into this category (Crainic et al., 2015; Mancini et al., 2014; Qureshi et al., 2009; Taniguchi & Shimamoto, 2004; Yang & Moodie, 2011).

The second category concerns research that is dedicated to physical deliveries in cities and related aspects, such as loading and unloading infrastructure, physical sizes of vehicles, buildings and urban venues, and technology development in the movement of goods (Butrina et al., 2017; Chen et al., 2017; Conway et al., 2012; Giron et al., 2018; McLeod & Cherrett, 2011; Morganti & Gonzalez-Feliu, 2015; Sánchez-Díaz, Holguín-Veras, et al., 2016; Verlinde et al., 2016; Verlinde et al., 2014; Zou et al., 2016; Zunder et al., 2014).

The third research category is primarily focused on policy assessment (Anderson et al., 2005; Dablanc, 2007; Dablanc et al., 2011; Gatta & Marcucci, 2014; Russo & Comi, 2011; Stathopoulos et al., 2012), the role of the local authorities in urban goods movement (Lindholm & Blinge, 2006; Lindholm & Blinge, 2014), UFT planning (Cherrett et al., 2012; Lindholm & Behrends, 2012; Russo et al., 2016) and the role of stakeholders and collaboration (Ballantyne et al., 2013; Gatta & Marcucci, 2014; Hensher & Brewer, 2001; Hensher & Puckett, 2004; Lindholm & Browne, 2013; Macharis et al., 2014). Behavioural research also belongs to this group (Balm et al., 2016; Holguín-Veras, Aros-Vera, et al., 2015; Holguín-Veras & Sánchez-Díaz, 2016; McLeod et al., 2015; Sánchez-Díaz, et al., 2016; Zunder et al., 2014). Behavioural research describes the behaviour of various groups of stakeholders in the urban freight supply chain, such as shippers, carriers, city authorities and goods receivers.

Understanding how stakeholders influence UFT activities (intentionally or otherwise) is essential to consider policy levels and other approaches that could lead to more sustainable practices. The following subsections will provide a summary of the research on stakeholders in UFT to address this topic as follows: i) explaining the importance of stakeholder engagement in urban freight, ii) addressing how the term “stakeholders” is used in the context of urban freight research, iii) explaining how different approaches reflected in the literature regard who are considered to be stakeholders in urban freight, and iv) identifying which stakeholder groups are viewed as the key stakeholders that create the most impact on urban freight activities. This summary is designed to facilitate the introduction of the motivation of the research and eventually the research purpose and research questions.

The importance of stakeholder engagement

Research on stakeholders and their engagement in urban freight is essential to advance the transition to a more sustainable urban freight transport sector. It is fundamental to understand how business and commercial activities are related to freight movement patterns and to supply chains that provide goods and services in cities. For significant changes to occur, it is essential to engage businesses with activities in urban areas, bring their attention to how their physical flows are organised

and provide alternatives that can lead to more sustainable goods deliveries. Support from the decision-making stakeholders at the local level is also important, and the starting point should be recognition of the importance of businesses and supply chains in local economies and the role this plays in supporting a vibrant urban milieu. It is also necessary to establish dialogue between private stakeholders (e.g. businesses) and public stakeholders (e.g. city authorities) to secure that the private sector perspective is taken into consideration during the decision-making and policy-designing processes.

Stakeholders in urban freight

There are several definitions and classifications of urban freight stakeholders. The term stakeholders is relatively new to UFT research and stems from stakeholder theory (Freeman, 1984; Parmar et al., 2010). For example, in his book, Ogden (1992) occasionally referred to participants and participating groups of the urban freight process as “actors”, putting the term in quotes (p. 15). Stakeholders, in a general sense, can be defined as the actors that are affected by or can impact certain situation or phenomena (e.g. Freeman, 1984). Originally, the term stakeholder often referred specifically to someone within an organisation but today the term is used more broadly being considered as a web of relationships in a business network, branch or industry and, thus, extending beyond one company or organisation (Andriof & Waddock, 2017).

In current research, the term stakeholders in UFT is often used to indicate people and organisations that can impact or are affected by UFT, without necessarily referring to stakeholder theory and its extended implications. In UFT research, most authors use the terms stakeholders and actors interchangeably, specifying that certain stakeholders have a key role in UFT or may exert a more direct influence on the supply chain in UFT (Holguin-Veras et al., 2020a, 2020b; Taniguchi et al., 2001; Russo and Comi, 2011; Anand et al., 2012). More as an exception, Ballantyne et al. (2013) pointed out the difference between stakeholders and actors, classifying participants in UFT as stakeholders or actors depending on their relation to UFT: stakeholders have an interest in UFT, whereas actors are stakeholders that can directly impact UFT (Ballantyne et al., 2013).

According to stakeholder theory, the term stakeholders perhaps should be applied within the theory framework, and outside this theory, stakeholders should be called actors. However, due to the current established practice of using the term stakeholders in UFT research and the desire to fit the research reported in this thesis into the existing urban freight research discourse, it was decided to use the term stakeholders along with the term actors. In the research reported in this thesis, the terms stakeholders and actors are used interchangeably. They refer to people and organisations that participate in UFT in different forms, can impact and be impacted by UFT, or have some interest in UFT.

There are different approaches in the research regarding whom to consider to be stakeholders in UFT. A more expanded discussion about stakeholders in urban freight transport is discussed in Chapter 3 Frame of reference. According to Ballantyne et al. (2013), the actors (which are also stakeholders) in urban freight are shippers, freight transport operators, authorities and customers (or goods receivers). The stakeholders are vehicle manufacturers, trade associations, diverse commercial organisations, property owners, public transport operators, citizens and visitors (ibid).

Most of the research in urban freight transport that addresses stakeholders has been focused on those directly associated with goods deliveries in cities (like carriers, good receivers, shippers) and those that can exert a certain regulatory power over the goods deliveries in cities, such as local authorities and other regulatory institutions. The role of these stakeholders is clearly important because they play an important role in supply chain and goods deliveries.

Carriers have been targeted by many researchers as key stakeholders, as they physically deliver the goods and, thus, should often be responsible for making deliveries more sustainable. In this respect, a lot of research has been dedicated to transport operators and 3PLs to improve their efficiency and performance, as well as delivery organisations to make urban deliveries more sustainable (Arvidsson, 2013; Arvidsson et al., 2013; Nguyen et al., 2018; Woxenius, 2012). While this research is important, some argue that policies aimed primarily at carriers are less

effective, since carriers operate in a highly competitive environment and, thus, will primarily comply with their customers' demands (Holguín-Veras, Aros-Vera, & Browne, 2015). For example, time restrictions imposed on transport operators often lead to additional environmental and financial costs (Browne et al., 2005; Danielis et al., 2010; Muñuzuri et al., 2005). Transport operators and 3PLs already consolidate numerous deliveries to be as efficient as possible to survive in a competitive market, even though their fill rate is often not efficient enough (Browne et al., 2007; de Magalhães, 2010.)

Regulatory institutions have also been studied, as many researchers believe these stakeholders can resolve most challenges in UFT. Important work has been conducted to understand how aware local authorities are about the challenges imposed by UFT (Lindholm, 2012) and aim to increase this awareness by promoting, for example, freight partnerships in various cities around the world (Lindholm & Browne, 2013; Lindholm & Browne, 2014; Quak et al., 2016). However, because of the complexity of UFT due to the multiplicity of the private actors involved, the complexity and fragmentation of physical flows, and the market-driven, competitive business relationships, the implementation of entirely regulatory tools cannot resolve the challenges in UFT.

Shippers have received attention in the literature in terms of their power to choose transport providers and carriers and, thus, possibly prioritise providers with a more sustainable profile. These matters have been addressed in the body of research on the procurement of transport services and their impact on sustainability in urban freight transport (e.g. Rogerson, 2017; Hedvall et al., 2017).

Goods receivers have received more attention in the literature in recent years. In the UFT research literature, goods receivers are often referred to establishments that are characterised by being located in a city and having physical links to the goods and the carriers that deliver those goods. Most goods receivers are private sector businesses (e.g. shops, restaurants, commercial offices), public sector organisations (e.g. hospitals, schools, public authorities), and private receivers or residents (a feature that is increasing with the rise of e-commerce and home delivery). Earlier

research had viewed goods receivers as stakeholders that were merely receiving their goods and did not play a significant role in the supply chain (Ogden, 1992; Taniguchi & Thompson, 2014). However, the wider research community now suggests that the attention should be focused on goods receivers, since this group can potentially influence the supply chain by changing requirements for deliveries or altering the demand (Holguín-Veras & Sánchez-Díaz, 2016). A range of measures that can be initiated by goods receivers has been proposed, such as a receiver-led consolidation of goods and a range of studies on freight demand management (FDM) (Holguín-Veras & Sánchez-Díaz, 2016; Holguín-Veras, Sánchez-Díaz, & Browne, 2016). The problem is that goods receivers are a heterogeneous and fragmented group of actors; with the rise of e-commerce, their freight delivery patterns are becoming extremely fragmented. Therefore, developing policies and rules for receivers as stakeholders in UFT is challenging.

The research on stakeholders concerning shippers, carriers, goods receivers and regulatory institutions is important and necessary. However, there are other stakeholders in UFT that have been mentioned in the literature but have received less attention. These stakeholders have been characterised by some researchers as not having a direct impact on urban freight (Ballantyne et al., 2013), thus they are sometimes defined as indirect stakeholders (De Chennevière et al., 2017; Fredriksson et al., 2021; Lindholm, 2014). These are property owners, trade associations, commercial organisations, visitors and citizens. As previously mentioned, while these stakeholders have received much less attention in the literature, some may be important to consider as they might have a substantial influence on the UFT system.

1.3 Research purpose and research questions

The purpose of this PhD thesis was to identify and study organisations (other than carriers, goods receivers, shippers and regulators) that can have an important influence on urban freight transport, explore how these organisations can promote changes in urban freight transport to be more sustainable and through what measures, and understand what

characteristics of these organisations may play an important role in extending sustainable urban freight transport initiatives. To fulfil the purpose of this study, three research questions (RQs) were specified.

RQ1: In addition to shippers, carriers, receivers and regulators, which organisations have important impacts on the sustainability of urban freight transport?

This research question is designed to explore and identify organisations that are not directly involved in freight transport activities in terms of sending, transporting or receiving goods but rather exert a certain influence on how other supply chain members organise and manage their goods flows. The specific focus is placed on organisations that, in a certain way, group activities or build relations with goods receivers. Such an organisation may be able to encourage goods receivers to work together in different ways. However, this does not exclude the possibility of these organisations to influence other participants in the urban freight supply chain including carriers and shippers.

RQ2: What type of measures can these organisations take, and how can they promote changing urban freight transport to be more sustainable?

The aim of this research question is to explore if these organisations (other than shippers, carriers, receivers or regulators) can promote changes in urban freight transport to become more sustainable and, if so, how can they accomplish that aim. The measures can be defined as different initiatives and projects aimed to change established transport and logistics solutions in urban freight transport (Lindholm, 2012). While these measures, or initiatives, tend to have a more permanent character, temporal solutions can also be included here. These measures can also be initiated by local private businesses, public and private partnerships, local authorities and international institutions like the European Union. Similar terms that have been used in literature are the following: solution, initiative, policy measure, pilot action, pilot project and demonstration project. In this thesis, the term initiatives includes activities that may also be referred to as measures, projects or solutions.

RQ3: What are the characteristics of these organisations that can play an important role in scaling up sustainable urban freight transport initiatives?

This research question was designed to explore the characteristics of these organisations that place them in a position to play an important role in scaling up the implementation of *sustainable urban freight transport initiatives*, i.e. facilitating the introduction of sustainable initiatives into the common freight transport practices of a wide range of establishments (goods receivers). Answering this research question shows the importance of paying attention to these organisations, since scaling up research and pilot projects is a major challenge in UFT.

1.4 Appended papers and the outline of this thesis

This thesis is a compilation of four papers, each of which addresses at least one of the research questions. Figure 1 presents the structure of the thesis in terms of the purpose, research questions and papers appended.

Paper 1 introduces the concept of organisations other than carriers, shippers, receivers or regulators, proposes terms that can be used to define such organisations—*influencing organisations*, identifies different types of such organisations, explores the role they play in the development of sustainable urban freight transport solutions, studies the range of initiatives in which these organisations engage to support a more sustainable UFT sector, and examines how these initiatives may impact the business models of transport operators. This provides the answer to RQ1 and contributes to answering RQ2 and RQ3. *Influencing organisations* can be defined as norm-setting organisations that are not directly involved in the supply chain such as sending, transporting or receiving goods, but whose activities have an impact over the patterns of urban freight transport and the way in which deliveries are made in urban centres.

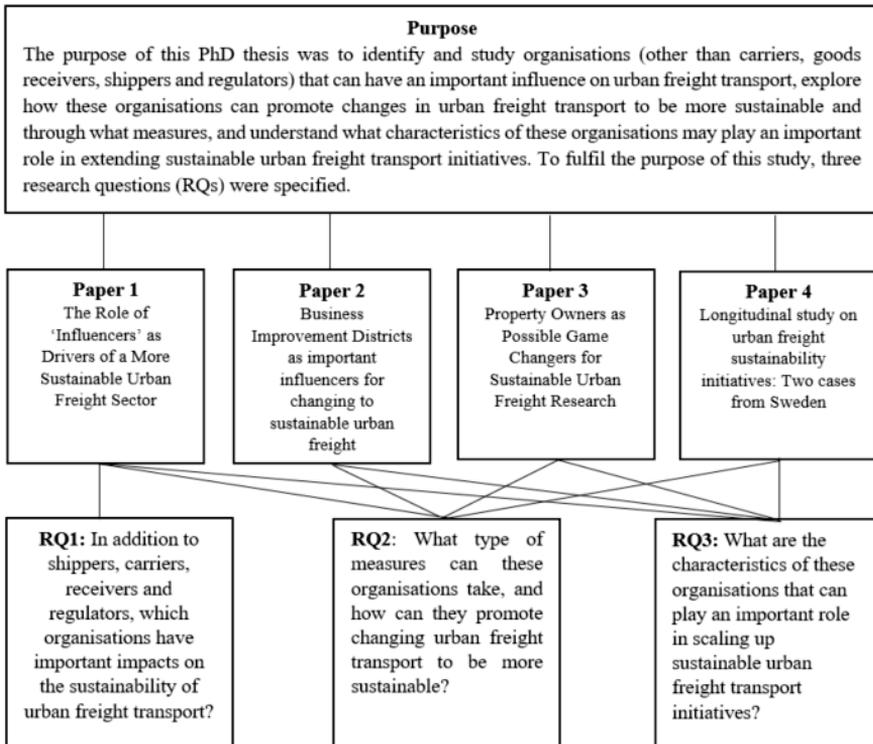


Figure 1. The structure of the thesis in terms of purpose, research questions and papers

Paper 2 explores and compares Business Improvement Districts (BIDs) as one type of an organisation (other than carriers, shippers, receivers or regulators) that have been called *influencing organisations*. It aims to explore their formation, organisational structure and governance, understand the extent of their awareness about UFT questions and their motivation to engage in these issues, determine their current, planned activities that may lead to a more sustainable UFT and establish which factors are the most important to foster sustainable goods movement solutions among their members. This research question contributes to answering RQ2 and RQ3.

Paper 3 focuses on property owners as another type of organisation (i.e. influencing organisation) other than carriers, shippers, receivers or regulators that has an influence on urban freight transport and their role in encouraging initiatives that lead to more sustainable UFT delivery practices. In particular, it studies the delivery patterns to a centrally located shopping mall in the city of Gothenburg and identifies how property owners could influence the delivery patterns of their tenants, proposing a range of initiatives based on the literature and observed delivery patterns. This paper contributes to answering RQ2 and RQ3.

Paper 4 is focused on the initiatives supported by organisations (i.e. influencing organisations) other than carriers, shippers, receivers or regulators with a specific focus on property owners. It studies two cases of consolidation initiatives in which property owners play an important role together with other stakeholders. In this paper, the particular focus lies on understanding how resource constellation and activity patterns in the cases become affected and change when new consolidation schemes are implemented, as well as aiming to determine where the resistance to change occurs. This paper contributes to answering RQ2 and RQ3.

Papers 1 and 2 have been published in peer-reviewed journals. Paper 3 was submitted to a peer-reviewed journal, has been reviewed by the editor and reviewers and has been revised and resubmitted by the authors. Paper 4 has been submitted to a peer-reviewed journal. The first three papers were presented at international conferences, and feedback from the research community on the initial versions of the papers was provided. A summary of the details about the appended papers is presented in Table 1.

During the PhD research process, several articles and a book chapter were also written that have not been included in this thesis. It should be noted that some of the empirical material used in the papers was included in this thesis. The summary of these other publications is presented in Table 3.

Table 1. Summary of the details about the appended papers

Paper	Title of the papers	Journal	Status	First version conference presentation
Paper 1	The Role of ‘Influencers’ as Drivers of a More Sustainable Urban Freight Sector.	<i>Sustainability</i>	Published	International City Logistics Conference, Dubrovnik, June 2019
Paper 2	Business Improvement Districts as important influencers for changing to sustainable urban freight.	<i>Cities</i>	Published	Mobilize Summit 2019, Dar es Salaam, Tanzania
Paper 3	Property Owners as Possible Game Changers for Sustainable Urban Freight Research	<i>Research in Transportation Business & Management</i>	Revised and resubmitted	8th METRANS International Urban Freight Conference (I-NUF), October 2019, Long Beach, USA
Paper 4	Longitudinal study on urban freight sustainability initiatives: Two cases from Sweden. Submitted to the journal	<i>Research in Transportation Economics</i>	Submitted and under review	Not presented

Table 2. The authorship of the paper and authors' contributions

Paper	First author	Other authors and affiliations	Authors contribution
Paper 1	Alena Brettmo	Jon Williamsson, University of Gothenburg, Sweden	Alena Brettmo: Conceptualisation, methodology, formal analysis, formulation of questions, data collection and investigation, data curation, writing—original draft preparation, review and editing. Williamsson: Conceptualisation, data collection and investigation, writing—original draft preparation, review and editing.
Paper 2	Alena Brettmo	Michael Browne, University of Gothenburg, Sweden	Alena Brettmo: Conceptualisation, proposed research approach to formulate the questions, formal analysis, data collection, writing—original draft preparation, review and editing. Browne: Conceptualisation, discussed analysis, writing—review and editing.
Paper 3	Alena Brettmo	Ivan Sanchez-Diaz, Chalmers University of Technology, Sweden	Alena Brettmo: Conceptualisation, methodology, formal analysis, data collection, writing—original draft preparation, review and editing. Ivan Sanchez-Diaz: Conceptualisation, methodology, formal analysis, writing—review and editing
Paper 4	Alena Brettmo		Sole author

Table 3. Publications produced during PhD studies that are not included in this thesis

Type of publication	Authors	Title	Comments
Conference paper, 2016	Brettmo, A., & Browne, M.	An exploratory study of the scope for receivers to influence urban freight consolidation through changes in their procurement practices.	Paper presented at the Logistics Research Network Conference (LRN) 2016, University of Hull, UK.
Conference paper, 2017	Brettmo, A., Browne, M., Holguín-Verás, J., Wojtowicz, J., Allen, J.	The role of intermediary organisations in influencing urban deliveries to receivers/establishments.	Paper presented at the International City Logistics Conference 2017, Thailand
Conference paper, 2018	Brettmo, A., Ringsberg, H., & Browne, M.	Evaluation of the use of public space in cities: a pilot-study of competing uses including urban logistics.	Paper presented at the Logistics Research Network Conference (LRN) 2018, University of Southampton, UK.
Conference paper, 2019	Brettmo, A., Sanchez-Diaz, I., Browne, M., Widegren, C.	What can property owners do for sustainable urban freight? The case of Nordstan shopping mall.	Paper presented at the 8th METRANS International Urban Freight Conference (I-NUF 2019), Long Beach, USA <i>Note:</i> This paper was further elaborated and finalised as a journal article. It is included in this thesis as Paper 3
Conference paper, 2019	Brettmo, A., & Williamsson, J.	'Influencers' in urban freight—a business model perspective.	Paper presented at the 11th International Conference on City Logistics, Dubrovnik, Croatia <i>Note:</i> This paper was further elaborated and finalised as a journal article. It is included in this thesis as Paper 1
Book chapter, 2019	Browne, M., Brettmo, A., & Lindholm, M.	Stakeholder engagement and partnerships for improved urban logistics, pp 257-273. In Browne, M., Behrends, S., Woxenius, J., Giuliano, G. and Holguin-Veras, J. [Eds] (2019) <i>Urban Logistics: Management, policy and innovation in a rapidly changing environment</i> , Kogan Page, London, ISBN 97809749478711.	

Outline of the thesis

Chapter 1 Introduction

This chapter provides the background to the thesis, research problematisation and motivation, and introduction to the research topic. It also includes the purpose, research questions and the outline of the thesis.

Chapter 2 Methodology

This chapter presents the methodology that is important in the context of this thesis. It includes the ontological and epistemological positioning of the thesis, description of the research design, research approach, data collection and data analysis. The chapter concludes with a summary of the methodology for each of the four papers.

Chapter 3 Frame of reference

This chapter presents the main concepts and topics examined in this thesis. The chapter provides an overview of the topic of sustainability in urban freight transport and identifies a range of sustainable urban freight transport initiatives that have been acknowledged by policymakers and researchers. The chapter concludes with a summary of research about stakeholders in urban freight transport.

Chapter 4 Findings

This chapter provides summaries of the appended papers with a strong focus on the scope of findings reported in each paper. The papers were designed to facilitate the answering of the research questions. The papers addressed different cases and use several research techniques, but they all focus on exploring the abilities of organisations other than senders, carriers, receivers or regulators to facilitate and promote changes in urban freight transport to be more sustainable.

Chapter 5 Addressing the research questions

This chapter addresses the research questions of this thesis and provides condensed answers to each one. It also provides an explanation of the trajectory of the research, clarifying the rationales behind the decision to focus mostly on two types of organisations during the research process.

Chapter 6 Conclusions

This chapter concludes and discusses the findings of the research in relation to the main research topics of the thesis—it highlights the potential importance of influencers in promoting sustainable urban freight initiatives. It also describes the contribution of the research and its practical implications, limitations and suggestions for future research.

2 Methodology

This chapter presents the methodology that is important in the context of this thesis. It includes the ontological and epistemological positioning of this thesis, description of the research design, research approach, data collection, and data analysis. The chapter concludes with a summary of the methodology for each of the four papers.

2.1 Ontological and epistemological positioning

The philosophy of research design

Within the social sciences, there are three widespread epistemological views on how research should be conducted: positivism, relativism and social constructivism (Easterby-Smith et al., 2002). They stem from different ontological grounds in social sciences, specifically representationalism, relativism and nominalism (ibid). Representationalism and relativism stem from internal realism and relativism within the ontology of science. Internal realists focus on epistemological perspectives, recognising that while reality is concrete and external, knowledge about it can be collected only indirectly because the process of observation affects what is being observed. They acknowledge the robustness of scientific laws unlike relativists, who recognise that theories or *the truth* are affected by political and social discourses in society (ibid). Nominalism accentuates the key role of names and labels that are given to events or occurrences, and this depends on who establishes these labels. Positivism and social constructivism are often seen as contrasting to each other. Researchers are invited to take one of these stands and position their research within these epistemological philosophical traditions (Easterby-Smith et al., 2002). The comparative positioning of ontologies and epistemologies in science and social science is summarised in Table 4.

Table 4. The positioning of ontologies and epistemologies in science and social science (adopted from Easterby-Smith et al., 2002)

Ontology of science	Traditional realism	Internal realism	Relativism	Relativism
Ontology of social science	Realism	Representationalism	Relativism	Nominalism
Epistemology of science	Positivism	Positivism	Relativism	Relativism
Epistemology of social science	Positivism	Positivism	Relativism	Social constructionism

Positivism assumes that reality is objective and comprehended by an independent observer. It focuses on causality, chooses simple units of analysis and aims to reach generalisations by implicating statistical probabilities and applying randomly selected large samples.

Social constructivism recognises the importance of the observer and of amplifying the understanding of the event or situation under study. It takes stakeholder perspectives into consideration and focuses on the overall situation instead of smaller units of analysis. For generalisation purposes, social constructivism uses theoretical abstraction and focuses on specifically chosen smaller cases rather than large random samples. Social constructivism is not theory-driven, which means that it focuses on primarily collecting empirical data and later inducing the assumptions based on the data. Ontologically social constructivism is coherent with nominalism, which researchers associate with a form of relativism (Alvesson & Sköldbberg, 2018; Berger & Luckman, 1967; Searle, 2006; Easterby-Smith et al., 2002).

Ontological and epistemological stance of the thesis

From an epistemological standpoint, this research was, to a certain extent, influenced by social constructivism, although it contains many elements of positivism. The research was exploratory and driven by collecting empirical data, and the data were analysed by the application of several theoretical frameworks that will be described later in this chapter. Such an

approach to knowledge creation can be categorised as abductive² (Alvesson & Sköldbberg, 2018), which is sometimes positioned in the literature between positivism and constructivism (ibid). At the same time, some elements of interpretation and sensemaking analysis were applied for the empirical data analysis. For example, the analysis of the data that were collected through interviews was conjugated with a constant attempt to understand the context of the environment in which the respondents were acting and making their decisions as well as their vocabulary and narratives (or discourse, in a broader meaning) to highlight the meanings that certain questions or events had for them.

At the early stage of the research, a review of applicable theories and theoretical approaches was conducted. This was accomplished by reading and summarising relevant literature on theories in logistics research and by consulting with the senior researchers from the transport and economic geography research community. To obtain insights from the researchers interested in transportation and logistics research, an interdisciplinary interactive seminar-workshop on theoretical perspectives in urban freight research was arranged at the University of Gothenburg through the Urban Freight Platform³. The seminar took place on 19 February 2016. Researchers from the transportation, logistics, supply chain management and economic geography fields attended the seminar and discussed the following topics: i) different theoretical approaches applied in logistics and urban freight, ii) opportunities to apply theoretical perspectives from a broader range of disciplines and iii) possibilities and opportunities to develop more cross-disciplinary and inter-disciplinary approaches in the field of research. The participants discussed and suggested a range of

² Abduction is an interpretive and innovative approach to theory-driven empirical research that is often used in case studies and includes some elements of induction and deduction. It focuses on building an empirical basis and using theoretical preconceptions to foster an understanding and explanations of these empirical patterns (Alvesson & Sköldbberg, 2018).

³UFP is an initiative supported by Volvo Research and Educational Foundations (VREF) on urban freight research based in Gothenburg, Sweden. The UFP works as a facilitator of academic research on urban freight within the context of the Northern LEAD logistics competence centre at the University of Gothenburg and Chalmers University of Technology

theoretical approaches that could also be considered for application for the research reported in this thesis, with a focus on qualitative research.

The exploration of several theoretical approaches applied in UFT research resulted in the decision to use the Industrial Network Approach (INA) (Håkansson et al., 2009) as a theoretical framework during different stages of the research process. In a general sense, this framework views businesses as interconnected in business networks, where actors, resources and activities are related and, to a certain degree, interdependent on each other. Business networks and their related elements are constantly changing and developing; they continually interact, change each other and become affected themselves (ibid). The application of this framework fostered the acquirement of a broader picture of the context and the environments (business environment, political and cultural environments) in which the organisations in question acted and interacted with each other. Understanding this contextual situation provided an opportunity to gain an understanding of the logic and the meanings of the actions, insights and motivations behind their decisions. Therefore, one could say that application theoretical frameworks (with a positivistic angle) would, to a certain degree, lead to obtaining interpretative or socially constructed knowledge. More information about the INA theoretical framework will be provided later in this chapter.

The purpose of this thesis was to focus on organisations other than carriers, goods receivers, shippers or regulators that may have an important influence on urban freight transport. During the earlier stage of the research, these organisations were grouped together and named *intermediary organisations*. This term was chosen to show their intermediate or “in-between” position towards actors with a more direct reach to the supply chain, including carriers, goods receivers, shippers and regulators. However, as the research developed and feedback was received at the mid-term seminar, it was decided to label them as *influencing organisations*. To closely study these organisations, it was decided to apply the INA framework as a tool for data collection and data analysis (for Paper 4), as well as put on INA “business network” lenses during the entire research process. Subsequently, case studies (Papers 2–4) and an interview study (Paper 1) were chosen as research design approaches to

conduct an in-depth study of the phenomena of these organisations in the context of urban freight transport research. A detailed description of the research design of the thesis is provided in the next subsection.

2.2 Research design of this thesis

Methodological implications in social science stem from ontological and epistemological stances. After deciding on ontological and epistemological stances, researchers should decide how to design the study by considering the following most common aspects of research design: researcher involvement, sampling, theoretical approach, empirical data collection, contribution to knowledge and quality of the research (Cooper, 2011; Easterby-Smith et al., 2002). This section provides a description and justification of the research design choices for this thesis.

Involvement of the researcher

Unlike positivism, researchers in a social constructivism paradigm are involved in the phenomena that is being studied (Berger & Luckman, 1967; Alvesson & Sköldbberg, 2018; Easterby-Smith et al., 2002). This is especially relevant for social studies, where it is difficult for the researchers not to become involved in the object being studied (Alvesson & Sköldbberg, 2018). Reflecting on the research conducted for this thesis, the involvement of the researchers can clearly be traced. For example, while executing the fieldwork in the form of face-to-face interviews, the researcher expressed her interests in sustainable urban freight transport and in finding possibilities to promote it between various stakeholders, including the interviewees. However, while the researcher was transparent about these research questions and interests, she did not lead the respondents to answer the questions in a certain way instead of being open and expressing their own thoughts and ideas.

Sample size

Within the social constructivism paradigm, the sample size is usually significantly smaller than it is for cross-sectional positivistic studies

(Alvesson & Sköldbberg; 2018). This is connected to the fact that the unit of analysis in such studies is larger. The unit of analysis is the entity that forms the basis of any sample (Easterby-Smith et al., 2002). In socially constructed studies such as case studies, the unit of analysis can be individuals, a specific event or another phenomenon (ibid). According to Yin (2018), in case studies, the unit of analysis is usually the “case” itself. However, sometimes the unit of analysis can go “one level down”, which can create confusion between the unit of analysis and the unit of data collection. If the aim is to study an organisation, then the unit of analysis may be the personnel that are working there, whereas the unit of data collection may be the individuals that are interviewed or observed (ibid).

For Paper 1, which was an interview study, the sample consisted of organisations that influence urban freight activities: property owners, facility management companies, Business Improvement Districts and public procurement organisations. The unit of analysis was the respondents that represented these organisations. In Paper 2, which was a multiple case study, the sample consisted of BIDs (the “cases”) that were involved or interested in urban freight questions. The unit of analysis was specific BIDs, but the unit of data collection was the management teams of the BIDs, BID-like organisations and other sources of data, including reports, print outs and web pages. In Paper 3, the sample consisted of one case, the Nordstan shopping mall located in Gothenburg, Sweden, specifically the freight trip patterns of the establishments located in this mall. In this paper, both qualitative and quantitative techniques were applied to build the case study and support the main arguments. The unit of analysis for the quantitative part was the businesses located in the shopping mall and their freight patterns, such as the number of trips generated per week, their control over the deliveries, the number of transporters involved and the types of goods delivered. Paper 4 was designed to be a longitudinal comparative multiple case study⁴, studying two consolidation initiatives where the property owners played an important role together with other stakeholders. The unit of analysis was the organisations that participated in the initiatives, and the respondents

⁴ In particular, it can be defined as a “two-case” case study (Yin, 2018)

were the units of data collection. The details about the units of analysis and samples for each paper are summarised in Table 5.

Table 5. Summary of the sampling/casing and units of analysis in the appended papers

Paper	Type of study	Unit of analysis	What was studied/ the case/ the sample
Paper 1	Interview study	Respondents that represented the studied organisations	Organisations that were studied: property owners, facility management companies, Business Improvement Districts and public procurement organisations
Paper 2	Case study	“Individual” BIDs	BIDs in three countries that have engaged in various urban freight initiatives or have an interest in urban freight transport
Paper 3	Case study	Establishments in Nordstan shopping mall	Freight patterns of the businesses located in Nordstan shopping mall
Paper 4	Longitudinal case study	Companies that participated in two urban freight initiatives	Two consolidation initiatives where the property owners played an important role together with other stakeholders

Theoretical approach

As mentioned earlier in this chapter, after deciding on the main topic of research (the phenomenon that should be studied), it was decided to apply INA as a theoretical framework to gain deeper insights into the subject and

conduct analyses in a more systematic and in-depth way. According to the Industrial Network Approach (INA), a business environment (such as a company, group of companies, branch, industry or business activity) should be seen as a business network where different companies are interconnected by business relationships (Håkansson et al., 2009). INA helps to foster an understanding of the dynamics of business relationships and the peculiarities behind them. The INA is a broad research approach that has been used to address and provide insights concerning a wide variety of research questions and problems. For this study, the focus was on the Actor-Resource-Activity (ARA) model within INA (Snehota & Håkansson, 1995; Håkansson et al., 2009), thus it was decided to include questions in the interview guide that were based on this model. The ARA model is a research tool that identifies the main actors, activities and resources (and the relationships between them, such as actor bonds, activity links and resource ties) that constitute the studied business network (ibid). Application of the ARA model can lead to an understanding of business network functioning and development, as well as how the relationships between the actors (and resources and activities) started and have changed and adjusted during interactions and over time.

Across the four papers, the data analysis applied several theoretical frameworks, including the business model analysis (BM), Freight Trip Generation (FTG), Shared Situation Awareness (SSA) and Joint Knowledge Production (JKP). A description of the BM and FTG frameworks is presented later in this chapter in the data analysis section and in corresponding papers (Papers 1 and 3, respectively). A description of the SSA and JKP frameworks is presented in Paper 4. While these frameworks were beneficial in relation to the respective research aim of each paper, the “main” theoretical approach in this thesis should be considered the Industrial Network Approach as it frames, to a certain degree, the researchers’ view of the studied organisations through the prism of business networks.

Fieldwork

Fieldwork is an established research technique within the social constructivism paradigm, which is opposite to the quasi-experimental

research methods within the positivistic paradigm (Easterby-Smith et al., 2002). Fieldwork refers to studying objects in a real social setting, for example, companies or processes (ibid). Fieldwork studies can include the use of positivist methods (e.g. various quantitative techniques), constructionist methods (e.g. ethnographies) or narrative methods (e.g. interview studies with a strong focus on collecting the respondents' stories) (Czarniawska, 2004). Case studies are a commonly used approach in fieldwork studies, and according to Easterby-Smith et al. (2002), from an epistemological standpoint, it can be placed between constructionist and positivist methods. Case studies formed an important element in the research approach for this thesis. The fieldwork was an essential aspect of this thesis, enabling empirical data collection through interviews. A more detailed description of the research approach and data collection methods chosen for this thesis is provided in Section 2.3.

Generalisation

Universal validity or generalisation of the results are an essential part of the evaluation of research quality. A positivistic paradigm requires universality of the results, which means that the results obtained from studying the sample should be equally applicable to the rest of the population. The social constructivism paradigm advocates for the generalisation of results in terms of creating local knowledge that is applicable within a similar context, such as cultural, national or political contexts (Easterby-Smith et al., 2002). A generalisation of the results of this thesis is possible but requires careful consideration of the context. For example, the study on BIDs and BID-like organisations shows that they differ from country to country, and their engagement with urban freight questions varies as well. However, the research also showed that they are important, influential organisations that are motivated to create additional value for their members, have collective power, engage in various place-making projects and can unite many goods receivers. Therefore, they could be essential stakeholders in promoting sustainable urban freight initiatives in their neighbourhoods. The results of the studies about property owners (Papers 3 and 4) could possibly be generalised in Scandinavian or West European city contexts, with the consideration of local peculiarities as well as infrastructural or legal constraints.

Validity and reliability

It is crucial to ensure research quality by applying validity and reliability perspectives. According to traditional textbooks on methodology, three main types of validity have been differentiated: construct, internal and external (Easterby-Smith et al., 2002; Yin, 2018). Construct validity estimates the correctness of the instruments and measures applied to the studied phenomena (Yin, 1994). Internal validity estimates the capability of the research design to eliminate bias and the distorting effects of external variables (Easterby-Smith et al., 2002). External validity is connected to the possibility of generalising the findings (Bryman & Bell, 2007). From the social constructivism approach, validity is measured by the ability of the research to estimate the experiences of “those in the research setting” (Easterby-Smith et al., 2002).

To enhance construct validity, Yin (1994) suggested using multiple sources of evidence during data collection as well as feedback from the respondents. For the thesis, multiple sources of data were used, including academic literature, secondary data in the form of company reports and data collected during the fieldwork. In addition to the above, the qualitative research was complemented by a quantitative study (in Paper 3) to ensure that the research purpose of the study was reached as well as support to build the case. A member check is another way to ensure the construct validity of the study. During the research reported in this thesis, the interviewees received the interview guides prior to the interview. The interview guides were thoroughly prepared and tested prior to the interviews. Follow-up feedback from the respondents was also requested to ensure the correctness of interpretation of the results received during the study. A final presentation of the results from each study was also provided to the respondents and the other participants of the study. Construct validity was strengthened by discussing the research process with the co-authors of Papers 1, 2 and 3 during several phases, such as data collection, data analysis and consultations with other researchers during seminars, conferences and workshops.

Internal validity or credibility can be enhanced by collecting data and building the case over a longer period of time to avoid additional explanations (Yin, 1994) as well as using multiple sources of evidence to avoid bias (Creswell, 2013) and pattern matching (Yin, 2018). To avoid preconceptions and bias, several strategies were applied during the research process. The interview guides for Papers 1, 2 and 4 were carefully prepared using different sources of literature, consulting with senior researchers and testing the interview guides in different settings before conducting the interviews. For example, prior to developing the interview guide for Paper 2, BID websites were reviewed and discussions were conducted with the researchers that were involved in the initial studies in London from 2014–15 and in New York. During the interviews, the same interview guide was used for all respondents (from the same study). Multiple interviews were conducted with several respondents from multiple organisations and even countries, and the answering patterns were compared (pattern matching). Some of the respondents were interviewed several times over a longer period of time. For Paper 4, the case was built during 2016–2021 and can be considered as a longitudinal study. In Paper 3, multiple sources of evidence were used, including a literature review; data on goods deliveries and pick-ups to the Nordstan shopping mall in Gothenburg were obtained from the original case study on Nordstan that was run by the City of Gothenburg’s Traffic and Public Transport Authority in 2016. Multiple consultations with the people involved in the data collection for this dataset were conducted to ensure correct interpretations of the data. Statistical methods of data validity and reliability were applied during data curation (in Paper 3). Transparency was also exercised regarding how the data were collected and analysed in this thesis, for example, all the interviews were recorded and then fully transcribed. Both recordings and transcriptions were saved and could be revisited, if needed.

For the external validity of the case studies, Yin (1994) suggested applying analytical generalisation rather than statistical generalisation, which complies with the social constructivism paradigm (Easterby-Smith et al., 2002). External validity or generalisation of the findings was discussed earlier in this section.

From a positivistic perspective, reliability is about consistency and the possibility to obtain similar results during the replication of a study (Voss et al., 2002). Yin (2018) suggested developing and applying case-study protocols and databases to ensure reliability of the study. According to Silverman (2001), in qualitative research, there are several ways to increase reliability, including the use of unified methods for writing field notes, documenting and analysing data and comparing the same data among several researchers. As mentioned above, the research process for building the cases was thoroughly documented in the form of an interview guide, research questions, interview recordings and transcriptions, documentation of the selection of interviewees and the companies they represented, characteristics of the respondents and interview settings, and a description of how the data were analysed for each case.

From a social constructivist approach, reliability is measured by the degree of transparency of the analysis of the data collected and how assumptions and conclusions were drawn from this data (Easterby-Smith et al., 2002). For this thesis, all stages of the research process (the research design, research process, data collection, data analysis, the reasoning process, argumentation and discussion) were transparent; all the conclusions drawn from the study were entirely based on the data collected during the research process. The interviewees could comment on the transcriptions of their interviews. All the interviews were recorded and thoroughly transcribed. During the data analysis, the transcriptions of the interviews were read by other researchers, including the co-authors of the papers as well as advising researchers. The research reported in this thesis can be considered reliable, even though a certain level of subjectivity could have affected both the data collection and data analysis processes. However, another researcher can use the material of the study and follow up how the data were collected and analysed to conduct a similar study.

Aside from the mentioned criteria, the strengthening of the validity and reliability of the research reported in this thesis was enhanced by the reviewers of the papers. Papers 1, 2 and 3 were peer-reviewed by anonymous reviewers and editors of the journals. Papers 1 and 2 are published. Paper 3 was revised by three reviewers, has received generally positive feedback, then was revised by the authors and was resubmitted to

the journal. Paper 4 has been submitted to a journal and is currently under review by reviewers and editors. Moreover, the initial versions of the papers were presented at several international conferences during 2016–2020.

2.3 Research approach, data collection and data analysis methods

The purpose of the study determined the research design and research approach of this thesis. Case studies and interview studies were chosen as the research approaches. The justification of this choice and the case selection is provided below, followed by a description of the data collection methods and data analysis techniques applied for this thesis.

2.3.1. Case studies

The case study research approach is widely used by researchers to obtain a deep understanding about the object of study. Case studies are focused on a detailed contextual analysis of a limited number of events, processes and their relationships “within the real-life context” (Yin 1994, p.1). Case studies can have explanatory, exploratory and descriptive characters (Yin, 1994). As a rule, case studies belong to qualitative research methods, although quantitative techniques are commonly used for the analysis of the collected data while studying the case (Yin, 1994). Case studies presume the usage of data collection methods such as interviews, observations, documents and archives (Blumberg et al., 2008). Case studies can be single or multiple and, depending on the research purpose, the unit of analysis or the case. On the one hand, multiple cases increase the reliability of the study, but on the other hand, summarising multiple cases might be difficult in certain circumstances (Flyvbjerg, 2006).

The main advantages of case studies are the following: applicability to study new and complex social phenomena, providing “real expertise” in certain areas (Flyvbjerg, 2006, p. 239), and the availability of multiple sources of data, which, in turn, can be validated via triangulation (Denscombe, 2014). The disadvantages are connected to difficulties with

generalisation, especially within positivistic epistemological traditions; in addition, designing and conducting a case study is a demanding, time-consuming task that requires a high command of research skills (Blumberg et al., 2008). Case studies should comply with a number of criteria for good research, such as a clear definition of purpose, an accurately planned research design, high ethical standards, an honest presentation of the limitations and justified results (Blumberg et al., 2008; Easterby-Smith et al., 2002).

Case studies have become a widely used research approach in the social sciences (Eisenhardt & Graebner, 2007). Nevertheless, case studies have been criticised for being subjective, biased and lacking certain prerequisites for generalisation, practical implications of the results and being fully trustworthy (Flyvbjerg, 2006; Siggelkow, 2007; Yin, 1994). Such disagreements can arise from a clash of the two aforementioned epistemological paradigms—positivism and social constructivism. However, researchers have demonstrated that case studies can be persuasive (Siggelkow, 2007), trustworthy and extremely productive in terms of knowledge gathering, hypothesis building, theory creation and even generalising the findings in the context of theoretical abstraction and local knowledge creation (Flyvbjerg, 2006, Easterby-Smith, 2002). Flyvbjerg (2006) realised a detailed analysis of the main misunderstandings about case studies in social research and thoroughly debunked them one by one. For example, one misunderstanding about case studies is a quite common belief about the predominance of abstract (context-independent) knowledge over concrete (context-dependent) knowledge. Flyvbjerg (2006) used the counterargument in his debate for case studies, stating that context-dependent knowledge is the only source to gain real expertise and “move from being a beginner to being an expert” (p. 222). This complies with the main implications of social constructivism epistemology in terms of its knowledge creation function. Flyvbjerg (2006) viewed case studies as a valuable method to obtain knowledge, especially innovative knowledge. In this research, the aspirations were to reveal another view on urban freight transport and its improvement by attentively looking at a less studied group of stakeholders that influence urban freight activities.

Case selection plays a critical role and is related to the purpose of the study. Flyvbjerg (2006) suggested utilising the most typical or less typical cases, for verification or falsification purposes, respectively. Random selecting is not recommended because of problems with representativeness, as cases should be carefully picked for a certain reason in accordance with the purpose of the study⁵. Each of the papers following the kappa contains a detailed description in the methodology section, including how and why the cases were selected. For example, in Paper 2, BIDs across three countries were selected on the basis of their interest and/or involvement in urban freight initiatives, rather than choosing random BIDs. Each of the papers following the kappa contains a detailed description of the case selection rationales within the methodology section.

2.3.2 Data collection

Interviews

Due to the choice of research design and the purpose of the study, interviews were chosen as the main data collection method. Interviews are a highly common and widely used method in qualitative research (Czarniawska, 1998; Kvale, 2006; Silverman, 2007). There are different types of interviews, such as structured, semi-structured, unstructured, individual and group interviews (Blumberg et al., 2008). The advantages of interviews as a data collection tool are as follows: they are a source of valid and valuable information, as the researcher strives to meet the “right” people who possess crucial knowledge; they are quite easy to conduct and do not require special technical arrangements (Denscombe, 2014); and the response rate is usually high, as people like to talk and are seldom listened to without being judged or somehow compromised. The disadvantages of this method might include the following: difficulties with structuring data from unstructured interviews; geographical and resource limitations; reliability of information, since the interviewer has to trust the respondent’s words (Denscombe, 2014); difficulty to contact key people

⁵ Flyvbjerg, 2006

and obtain consent for the interview; and the influence of the interviewers themselves (Denscombe, 2014; Kvale, 2006).

For this study, the author of this thesis conducted 34 interviews with representatives from 23 organisations located in Sweden, the UK and the USA from 2016–2021. The second author in Paper 1 conducted additional interviews for the study (five interviews at five companies). The interviews usually took one to two hours. Most of the interviews were conducted in English, whereas some were in Swedish and then translated to English to prepare the data for analysis and facilitate the analysis itself. In this research, semi-structured in-depth interviews were used, in that the topic and the direction of the conversation were set, but space was left for the interviewees to share more information and implicit knowledge on the subject. Most of the interviews were organised as face-to-face interviews, whereas some were organised using videoconference software due to the pandemic restrictions during 2020–2021.

The interviews were designed as semi-structured, using the interview guide as a starting point for the conversation. Some parts of the interview guide contained questions that were designed to collect data that could be used for an Actor-Resource-Activity model analysis within an Industrial Network Approach. This part of the interview guide was strictly structured and thoroughly followed during the interview to obtain the necessary data for analysis. All interviews were recorded with consent from the interviewees and then transcribed. An interview guide with open and semi-structured questions was prepared in advance. Prior to each interview, the interview guide and an overall presentation of the research focus was sent to the interviewees. The aim was to give the respondents the possibility to prepare themselves for the interview and familiarise themselves with the topic. Later, the material obtained from the interviews was used for analysis and findings. When relevant, the transcript, parts of the results and analysis sections, or the draft of entire paper was sent to the interviewees for informant feedback.

From a social constructivism perspective, interviews are one of the most suitable methods for collecting data (Easterby-Smith et al., 2002). Face-to-face interviews can give access to respondents and often even their

habitual setting, such as their workplace at the company or organisation. Interviews are time-consuming, and conducting interviews requires good communication skills from the interviewer, sensitivity and the ability to create a setting in which the interviewees are willing to reflect about their beliefs and share them with the interviewer (Cooper, 2011).

Literature review

A literature review is the point of embarkment for any kind of research, including research in the social sciences. It is essential to obtain familiarity with relevant literature on the topic of study (Webster & Watson, 2002). For each paper included in the thesis, the relevant literature was studied and summarised. The literature used for the research included the following sources: peer-reviewed journal articles, books, conference papers, company reports, best practice reports, books, presentations, internet homepages, theses and dissertations, government publications and official statistics. The literature study covered a wide range of topics in research in urban freight transport and city logistics, with a focus on research on stakeholders, last-mile deliveries, consolidation activities, property owners, BIDs, purchasing and public procurement practices, facility management services, sustainability initiatives in urban freight, green innovations and business performance.

2.3.3 Data analysis

Case studies were selected as the main research approach in this thesis, as they were chosen for Papers 2, 3 and 4. Paper 1 was designed as an interview study. The cases were carefully selected to ensure their relevance to the purpose of the study and to address the research questions. The empirical data were collected using interviews. During the data collection stage, various data analysis methods were applied to obtain deeper insights from the data. To be more specific, the following methods and approaches were used to build up the cases:

- *Actor-Resource-Activity model in the Industrial Network Approach*

As already mentioned, an INA theoretical framework was applied during the research process. In Paper 4, the ARA model in INA was applied for data analysis for the case as an analytical framework (Snehota & Håkansson, 1995; Håkansson et al., 2009). The ARA model is a research tool that identifies the main actors, activities and resources (and the relationships between them, such as actor bonds, activity links and resource ties) that constitute the studied business network. Application of the ARA model helps to understand business network functioning and development as well as how the relationships started and have changed and adjusted during interactions and over time (ibid). During the analysis, two important attributes of resources and activities were considered: *heaviness of resources*⁶ and *interdependencies of activities*⁷ (both heaviness of resources and interdependencies of activities are the specific terms of the ARA model in an INA approach). The purpose of the analysis was to understand how resource constellation and activity patterns in the cases are affected and change when new consolidation schemes are implemented.

- *Business model analysis*

To analyse the data collected, the business model method was used in Paper 1. The business model concept is often used as a means to define both the organisational and financial architecture upon which a business rests, and the business model is deployed in a way to demonstrate how the business creates and delivers value to customers (Teece, 2010). As such, the business model concept is a *broad* description of what makes a business function in a specific setting or with certain types of resources or processes in place (Zott et al., 2011). A generally accepted definition and widely used application of the business model concept is the business model canvas (BMC) (Osterwalder & Pigneur, 2010), which has been applied in earlier urban freight transport research (Quak et al., 2014). The

⁶ The attribute created by past investments into the resources (in forms of financial costs, administration and management efforts, time, relationships). Existing resource constellations impede the emergence of new resources in the network, for example, the acquisition of more advanced technologies

⁷ The process through which the activities in the network adjust to each other for better performance and become interdependent on each other over time. Interdependencies prevent changes to some activities or the introduction of new activities, impeding the implementation of innovations and the general development of the network.

BMC provides a detailed understanding of a business model by dividing it into blocks that are mapped using pre-specified questions. These questions are linked to both the practical and theoretical aspects of business management (Osterwalder & Pigneur, 2010), implying that the BMC builds on an eclectic selection of perspectives concerning what that drives a company and enables it to become profitable. The BMC comprises nine building blocks grouped into four sections that describe the key aspects of business models (Osterwalder & Pigneur, 2010): (i) customers (customer segments, customer relationships and channels used to interact with customers), (ii) offering (the value offering that the company presents to its customers), (iii) infrastructure (the key activities, key resources and key partners needed to produce the offering) and (iv) finances (the revenue streams and cost structure associated with the business model).

- *Freight Trip Generation (FTG)*

FTG modelling was applied following the data cleaning and curation in the case of the Nordstan shopping mall. To support the case study, the data collected via a survey were analysed using FTG modelling to identify and understand the main freight patterns of different groups of tenants of the mall. FTG model development is based on the following concepts (Holguín-Veras et al., 2011; Sánchez-Díaz et al., 2017):

- Freight Trip Attraction (FTA): defined as the number of trips attracted by the establishment during a certain time period, e.g. the deliveries of goods.
- Freight Trip Production (FTP): the number of trips produced by an establishment, e.g. the sending or returning of goods to another establishment.
- Freight Trip Generations (FTG): the sum of FTA, FTP and trips that involve both goods deliveries and pick-ups; this parameter can be used for the estimation of the traffic congestion generated by a certain establishment. The difference between FTG and general traffic counting is that FTG is more accurate, since the deliveries and pick-ups at an establishment can be executed at the same time, and one vehicle can deliver to several establishments in the same stop.

2.4 Methodology note on research design of appended papers

Research design—Paper 1

This paper was designed as a study of influencing organisations using interviews as the main data collection method. A series of interviews was conducted with different types of influencing organisations using the Actor-Resource-Activity (ARA) methodology from the Industrial Network Approach (INA). ARA supports the data collection on actors, specifically the resources and activities associated with the networks that arise from the interactions between the actors. As such, ARA shares similarities with the Business Model Canvas (BMC) in the sense that both tools aim to portray incentives for interaction. Therefore, the data collected through ARA can be analysed using a BMC because the principal themes of the business model (i.e. the logic behind the activities and interactions) were included in the data set developed through the ARA approach. To analyse the potential impact on how carriers run their businesses, the empirical material was scrutinised using the BMC as the principal tool.

Research design—Paper 2

The paper was designed as a case study. It aimed to obtain an insight into BIDs and their activities in several countries and understand their current and potential roles in influencing urban freight transport. The research approach can be characterised as exploratory and was based on assessments of published reports, previous papers, and primarily interviews with managers of BIDs. Regarding the choice of cases for the study, the idea was to look at BIDs that have been engaged in the topic of urban freight transport or have showed some interest in these questions, i.e. the choice of BIDs was not random. The intention was to obtain a better understanding into why they engage with these questions, what is the motivation to engage, how exactly do they engage, and what are the prerequisites for this engagement.

Research design—Paper 3

This paper was designed as a case study. It aims to understand the role of property owners in mitigating the negative impacts produced by freight transportation. To reach the aim, several research methods were applied.

A literature review was applied to identify how and why property owners engage in sustainability related to their properties. The quantification and analysis of freight volumes and freight trips were conducted using descriptive statistics, FTG modelling and non-parametric statistical tests. The data were obtained from a survey of Nordstan, conducted by the City of Gothenburg Traffic and Public Transport Authority (Trafikkontoret) in 2016. The data from the case were analysed to quantify freight volumes and assess how freight was transported to establishments that rent stores and offices at the mall. The results of the analysis were essential to identify what actions could be taken by property owners to disconnect freight deliveries from freight transport tips, thus leading to lower freight traffic in the area.

Research design—Paper 4

This paper was designed as a longitudinal comparative study of two consolidation initiatives in which the property owners play an important role along with other stakeholders. The empirical data were collected and analysed by applying the Actor-Resource-Activity (ARA) model within the Industrial Network Approach (INA) (Håkansson et al., 2009). Interviews were chosen as the primary data collection method, complemented by secondary data including a report (Elander et al. 2017) and PowerPoint presentations shared by the interviewees. Some parts of the interview guide contained the questionnaire that was constituted by applying the ARA model (Håkansson et al., 2009). The questions were formulated to obtain data on the actors, resources and activities involved in each case. The interviews were recorded, transcribed and analysed using the ARA model framework. The two cases studied in this paper described interactions and relationships between multiple companies. Application of the ARA model helped clarify business network functioning and development as well as how the relationships started and have changed and adjusted during interactions and over time.

3 Frame of reference

This chapter presents the main concepts and topics examined in this thesis. The chapter provides an overview of the topic of sustainability in urban freight transport and identifies a range of initiatives that have been recognised by policymakers and researchers as relevant to enhance sustainability in UFT. The chapter concludes with a summary of the research related to stakeholders in urban freight transport.

3.1 Sustainability in urban freight transport

Sustainability is a complex concept, and many definitions have been given in the academic literature. One of the most widely used definitions originates from the Brundtland Report published by the World Commission on Environment and Development (Brundtland, 1987), which defines sustainability development as follows (p. 54):

“Sustainable development is a development that meets the needs of the present without compromising the ability of future generations to meet their own needs”

Three dimensions of sustainability have been distinguished, which are sometimes referred to as the triple bottom line: environmental, social and economic (Elkington, 1998; Norman & Macdonald, 2004). There is an ongoing discussion about the hierarchy of these dimensions, specifically whether they should be addressed equally and simultaneously or if one should be prioritised over the others, as well as whether other dimensions should be developed within its boundaries (for example, the environmental dimension in natural sustainability criteria) (Sverdrup & Svensson, 2004; Norman & MacDonald, 2004; Abbassi & Nilsson, 2012). Independently from the stance of the discussion about the hierarchy of sustainability aspects, all three dimensions are essential and cannot be ignored or compromised. As already mentioned in the introduction to the urban freight transport sector, sustainability becomes affected in three areas—

planet, people and profit—and can be characterised by environmental, social and economic indicators (Quak, 2008).

Environmental indicators

As previously mentioned, the indicators of environmental sustainability in urban freight transport usually include air pollution, carbon dioxide emissions (CO₂), the use of non-renewable natural resources, and waste products. Fuel combustion engines of freight transport vehicles produce the following harmful emissions: carbon monoxide (CO), nitrogen oxides (NO_x), sulphur dioxide (SO₂) or sulphur oxides (SO_x), particulate matter (those with a radius of 10 microns or less (PM₁₀) are considered to be especially harmful), carbon dioxide (CO₂) and ozone (O₃) (Cullinane & Edwards, 2010). These pollutants (except CO₂) tend to concentrate near the source of emissions, for example, next to major roads and in cities (ibid); they are extremely harmful for flora and fauna as well as people's health and well-being.

Carbon dioxide is considered to produce a global effect on atmospheric pollution; it is also considered to be the main contributor to the global warming effect (IPCC, 2014). According to an International Environmental Agency report (IEA, 2020), transportation is accountable for 24% of direct CO₂ emissions from fuel combustion.

The use of non-renewable natural resources, such as fossil fuel, is considered to be among the environmental impacts of urban freight. The U.S. Energy Information Administration's (EIA) *International Energy Outlook 2019* (IEO, 2019) projected that the global supply of crude oil, other liquid hydrocarbons and biofuels should be sufficient up to 2050; however, the level of projected demand and supply is estimated to be substantially uncertain, as world energy consumption is expected to rise by nearly 50% by 2050.

Social indicators

The indicators of social sustainability affected by urban freight transport usually include the following: negative impacts of pollutants on human

health and well-being, traffic accidents causing injuries and death and jeopardising traffic safety, noise disturbance, odours, vibrations, visual intrusions cause by freight transportation, traffic infrastructure and congestion occupying space and green areas, and damage to buildings and infrastructure.

Air pollution is a significant environmental risk to health according to the World Health Organisation and is accountable for around 4.2 million deaths per year; it causes such illnesses as heart disease, stroke, lung cancer and chronic respiratory diseases (WHO, 2019). In 2016, more than 90% of the world's population lived in places that did not meet the WHO air quality standards (ibid). Fuel combustion from motor vehicles is one of the major sources of outdoor air pollution (WHO, 2019). According to the existing evidence, the most harmful pollutants for health impacts are the following:

- Particulate matter (PM), which mainly comes from the soot emitted by badly tuned diesel vehicles. It produces carcinogenic effects, cardiovascular problems and asthma (Cullinane & Edwards, 2010). Road transport accounts for up to 30% of PM in European cities and up to 50% of PM in OECD countries, mostly due to diesel traffic (WHO, 2019).
- Ozone (O₃) can lead to respiratory problems, asthma and nausea (Cullinane & Edwards, 2010).
- Nitrogen dioxide (NO₂) is emitted during combustion from high temperatures. It affects respiratory function, lungs and asthma (EPA, 2020)
- Sulphur dioxide (SO₂) is produced from the oxidised remains of sulphur that is burned in engines. It can cause eye, nose and throat irritation, generate respiratory difficulties and worsen respiratory illnesses and conditions (EPA, 2020).
- Carbon monoxide (CO) results from the incomplete combustion of carbon fuels. It binds haemoglobin and impedes circulation of oxygen in the body. At high levels, it can cause death (EPA, 2020).

Traffic accidents caused by delivery vehicles are another example of the negative impact on social sustainability produced by urban freight

transport. Accidents, personal injuries and deaths bring large financial and moral costs to society. The accident rate varies a lot between countries. The difference can be explained by a variety of factors, including driver behaviour, age of vehicle, vehicle maintenance, road standards and enforcement of safety regulations (Cullinane & Edwards, 2010). The European Commission and national governments have undertaken various measures to ensure road transport safety and prevent road transport accidents, including investments in infrastructure quality, intelligent car and transport system implementation, cargo shifts to other transport modes, traffic scheme changes, etc. (Galkin et al., 2019). At the national level, one example is a Swedish programme called Vision Zero, which includes a set of measures to eliminate fatalities and serious injuries from road accidents (Vision Zero). The programme was launched in 1995 and adopted by the Swedish parliament in 1997 as the basis for the work carried out in Sweden on road safety. As a result, the number of fatalities in Sweden caused by road accidents has more than halved, even as the volume of traffic has dramatically increased (Vision Zero).

Urban freight transport is one of the main contributors to noise pollution in cities. Noise disturbance produces the following externalities: loss of sleep, irritation and annoyance, communication difficulties, derogated cognitive capacities and impaired work productivity (Cullinane & Edwards, 2010). It can also contribute to long-term health issues in the future, such as cardiovascular diseases and mental illnesses (Den Boer & Schrotten, 2007; Stansfeld, 2015). A large part of the population in many cities is exposed to high levels of noise produced by road traffic (Ögren et al., 2018). The sources of nuisance produced by urban freight vehicles are engine propulsion noise, tyre and road contact noise, and aerodynamic noise produced by vehicle acceleration (Cullinane & Edwards, 2010). Targeting the source of noise is considered to be the most effective strategy for noise reduction; this focuses on driving behaviour, tyre and pavement properties, vehicle design and speed (Den Boer & Schrotten, 2007; Sandberg & Ejsmont, 2002). The strategy for tyre and pavement properties can include targeting the type and surface noise (for example, using low noise types on vehicles (Heutschi et al., 2016) and constructing pavement from low noise material, such as rubberised asphalt (Ohiduzzaman et al., 2016). Vehicle design and speed reduction measures are another group of

measures that are used for noise reduction purposes (Den Boer & Schrotten, 2007). Driving behaviour is another aspect that should be considered not only for driving but also during loading and unloading. These groups of measures have been targeted in promoting goods deliveries scheduled outside working hours (off-hour deliveries) (Holguin-Veras et al., 2014; Holguín-Veras, Wang et al., 2014; Holguín-Veras et al., 2015; Sanchez-Diaz et al., 2016).

Another important aspect to consider in the context of social sustainability is that urban freight transport is competing for open space and greenspace in cities, since some parts of open spaces in cities can be used for the delivery of goods, like sidewalks or pedestrian areas. Open public space in urban areas is an important part of public space, as it provides aesthetic, social, environmental, and health benefits to society (Rogers et al., 1999 in Thomson, 2002; Baines, 1999; Kaplan & Kaplan, 1989; Thompson, 1998, 2002). Open space consists of green areas like parks and green zones as well as smaller plazas and open space networks like pathways and sidewalks. Extensive freight transport activities in cities can lead to that vehicles can temporarily occupy some open spaces for loading operations, deliveries, and short-term parking.

Economic indicators

Urban freight transport activity affects the following indicators of economic sustainability: congestion; decrease in city accessibility, economic development and efficiency, journey reliability and delivery punctuality; and resource waste. Urban freight transport is a guarantee of the economic viability of cities. However, at the same time, excessive transport causes a number of externalities that have a negative effect on the economic sustainability of cities. For example, traffic congestion impedes accessibility and road safety and produces a lot of external costs. A recent study estimating the external costs caused by extensive freight traffic in the city centre of Gothenburg, Sweden, showed that traffic congestion constitutes 71% of all external costs, which also includes CO₂ emissions (11%), air pollution (8%), noise (6%) and traffic accidents (4%) (Alvbåge et al., 2020). Traffic congestion slows down transportation, negatively affects reliability of transportation, impedes accessibility and

can reduce productivity and resource use, which, in turn, can slow economy growth (Sweet, 2011).

Many scholars have noted that urban deliveries are characterised by inefficiencies that negatively affect economic sustainability. For example, urban deliveries are characterised by an inefficient capacity utilisation of vehicles and insufficient load factor performance, which, in practice, means that the delivery vehicles often drive half empty (Arvidsson et al., 2013; Santén, 2017). The delivery routes are often not optimised or are constrained by various factors (including regulating factors as well as service requirements), which lead to additional vehicle-kilometres produced to deliver consignments (e.g. Baudel et al., 2016; Cattaruzza et al., 2017). Inefficient urban freight transport and resource waste in terms of reduced productivity, lost economic opportunities and increased operational costs caused by, for example, traffic congestion or unreliable deliveries negatively affect the economic indicators of sustainable development.

It is important to admit that efficient urban freight transport is essential for the well-functioning of cities by contributing to their economic sustainability and the sustainability of economies around the world.

Sustainable urban freight transport

Behrends et al. (2008) summarised the definitions of sustainable transport, sustainable urban transport and urban freight transport given by various researchers and official institutions (e.g. EU Commission) in the form of reports and official documents (e.g. European Sustainable Development Strategy, 2001) in relation to the previously named sustainability dimensions. Based on their research findings, Behrends et al. (2008) posited that sustainable urban freight transport should meet the following criteria:

“to ensure the accessibility offered by the transport system to all categories of freight transport; to reduce air pollution, greenhouse gas emissions, waste and noise to levels without negative impacts on the health of the citizens

or nature; to improve the resource- and energy-efficiency and cost-effectiveness of the transportation of goods, taking into account the external costs and; to contribute to the enhancement of the attractiveness and quality of the urban environment, by avoiding accidents, minimising the use of land and without compromising the mobility of citizens.” (Behrends et al., 2008, p. 704)

This definition is broad and covers vital topics in urban freight: accessibility, environmental protection, economic viability and efficiency of transport services, liveability of urban environments, safety and quality of life. All these topics are essential and should be considered by researchers, policymakers and other decision-making institutions.

In the literature, a lot of attention has been deservedly given to the environmental aspect of sustainability, resulting in a strong focus on issues related to transport companies (carriers) (see e.g. Quak, 2012). This focus includes questions about the use of electric vehicles, maximising capacity utilisation in vehicles (e.g. Santén, 2017), route optimisation (Cattaruzza et al., 2017), load factor performance (e.g. Arvidsson et al., 2013), and so on. The research reported in this kappa has not sought to replicate earlier work but rather to build on it and consider how UFT initiatives could be extended to enhance environmental sustainability while considering the economic and social aspects of sustainability. In addition to the environmental aspect, much of the focus of this research was also given to the economic and social aspects, which are connected to the objective of scaling up sustainable urban freight initiatives to achieve far-reaching sustainable effects.

3.2 Initiatives to enhance sustainability in urban freight transport

The discussion of sustainability in urban freight transport is often organised in the context of measures that can be taken to make it more sustainable. As mentioned in Chapter 1, the measures can be defined as different initiatives and projects aimed to change established transport and

logistics solutions in urban freight transport (Lindholm, 2012). These measures or initiatives tend to have a more permanent character, although temporary solutions can also be included here. The measures are often initiated by local private businesses, public and private partnerships, local authorities, and international institutions, like the EU. Similar terms that are used in the literature are the following: pilot action, pilot project, policy measure, demonstration project, solution and initiative (Lindholm, 2012). In this thesis, the terms measures, solutions, projects and initiatives are used interchangeably. Thus, sustainable urban freight transport initiatives (SUFTIs) can be defined as measures that aim to improve established transport and logistics solutions in urban freight transport to make it more sustainable.

Researchers and practitioners have conducted numerous studies that propose a wide range of initiatives for decision-makers that aim to improve the sustainability of urban freight transport (*BESTFACT*, 2014; *BESTUFS*, 2007; Holguín-Veras, Amaya, et al., 2015; *SUGAR*, 2011). More recently, Holguín-Veras et al. (2020a, 2020b) reviewed and evaluated a range of sustainable urban freight transport initiatives from a public-sector perspective. The initiatives have been grouped as follows: infrastructure, vehicle-related, traffic operations, financial approaches, logistics, and demand management (Holguín-Veras, et al., 2020a, 2020b). A summary of urban freight transport initiatives that aim to improve freight activity in metropolitan areas is presented in Table 6.

The European Commission launched a European network of cities called CIVITAS in 2002. The CIVITAS network aims for better, cleaner transport in Europe and has already tested and implemented over 800 initiatives and urban transport solutions as demonstration projects in more than 80 Living Lab cities Europe-wide (CIVITAS). According to the CIVITAS Policy Note (2015), sustainable urban freight transport measures have been classified and grouped into six categories: stakeholder engagement, regulations, market-based initiatives, land use planning, new technology-driven measures and “eco-logistics” awareness-raising measures. A detailed specification of these initiatives is given in Table 7.

Table 6. A summary of UFT initiatives that could be used to enhance the efficiency of urban freight activity in urban areas (adapted from Holguín-Veras et al., 2020a, 2020b)

Infrastructure management	Major improvements	1. Ring roads 2. Freight clusters	3. New and upgraded infrastructure, intermodal terminal
	Minor improvements	1. Acceleration/deceleration lanes 2. Removal of geometric constraints at intersections 3. Ramps for handcrafts and forklifts	
Parking/loading areas management	On-street parking and loading	1. Freight parking and loading zones 2. Loading/parking restriction	3. Peak-hour clearways 4. Vehicle parking reservation systems
	Off-street parking and loading	1. Enhanced building codes 2. Timeshare of parking space 3. Upgrade parking areas and loading docks	4. Staging areas 5. Truck stops/parking outside of metropolitan areas
Vehicle-related strategies	Emission standards Low noise delivery programmes		
Traffic management	Access and vehicle-related restrictions	1. Vehicle size and weight restrictions 2. Truck routes 3. Engine-related restrictions	4. Load factor restrictions 5. Low emission zones
	Time access restrictions	1. Daytime delivery restrictions 2. Daytime delivery bans	3. Night-time delivery bans
	Traffic control and lane management	1. Restricted multi-use lanes 2. Exclusive truck lanes (dedicated truck lanes).	3. Traffic control
Financial approaches	Pricing	1. Road pricing	2. Parking pricing
	Incentives	1. Recognition programmes 2. Certification programmes	3. Operational incentives for electric/low emission vehicles
	Taxation		
Logistical management	Urban Consolidation Centres		
	Intelligent Transportation Systems (ITS)	1. Real-Time Information Systems (RTIS) 2. Dynamic routing	3. Vertical Height Detection Systems (VHDS).
	Last-mile delivery	1. Driver training programmes 2. Anti-idling programmes	3. Pick-up/delivery to alternate locations
Demand and land use management	Freight demand management	1. Voluntary off-hour delivery programme 2. Staggered work hours programme 3. Time slotting of pick-ups and deliveries at large traffic generators	4. Receiver-led delivery consolidation programme 5. Mode shift programmes 6. Changes in the destination of deliveries
	Land use policy	1. Relocation of Large Traffic Generators (LTGs)	2. Integrating freight into land use planning process

Table 7. A summary of initiatives for more sustainable urban freight transport (adapted from CIVITAS Policy Note, 2015)

Stakeholders' engagement	1. Freight Quality Partnerships 2. Freight advisory boards & forums	3. Designation of a City Logistics Manager
Regulatory measures	1. Time access restrictions 2. Parking regulation 3. Environmental restrictions	4. Size/load access restrictions 5. Freight-traffic flow management
Market-based measures	1. Pricing 2. Taxation and tax allowances	3. Tradable permits and mobility credits 4. Incentives and subsidies
Land use planning & Infrastructure	1. Adapting on-street loading zones 2. Using building code regulations for off-street delivery areas 3. Upgrading central off-street loading areas	4. Integrating logistics plans into land use planning 5. Collect points 6. Urban consolidation centres 7. Nearby delivery areas
New technologies	1. Dynamic routing 2. Real-time information systems	3. Traffic control
Eco-logistics awareness raising	1. Anti-idling 2. Eco-driving 3. Modal shift	4. Staggered work hours 5. Recognition and certification programmes

The literature shows that there is a range of measures and initiatives that aim to improve the sustainability of urban freight transport at different levels. During interviews and while constructing the case studies, three themes occurred as the most recurrent in relation to the groups of measures applied by private sector stakeholders: vehicle-focused initiatives, consolidation linked to a consolidation centre and consolidation through organisational and behavioural changes. A description of these measures is provided in the next subsection

Vehicle-focused measures

Vehicle-focused measures are measures such as the usage of greener vehicles for deliveries— that is, vehicles with higher environmental standards, such as low-emission vehicles, hybrid vehicles and electric vehicles. Freight transport in cities represents between 20 and 30% of vehicle kilometres (Dablanc, 2007). It is one of the largest contributors to ambient air pollution, including such pollutants as particulate matter (PM), nitrogen dioxide (NO₂), sulphur dioxide (SO₂), carbon monoxide (CO) and

carbon dioxide (CO₂), causing global warming effect (Couloumbel et al., 2018; WHO, 2019; EPA, 2020). One way to mitigate the negative impacts of vehicles on air quality is to use greener vehicles for deliveries, at least for those in cities. The negative impacts of heavy-duty delivery vehicles does not end with emissions and particles, as there are also other externalities such as noise, safety threats and occupying too much space, especially in areas where accessibility is limited. For example, many city centres, historic cities and towns have narrow streets with many pedestrian and on-street activities. Smaller quieter and low-speed electric vehicles are much better suited for deliveries in such areas. Last-mile delivery with these vehicles has been implemented in many cities, often with a connection to the consolidation of freight flows at the same time, for example, *Stadsleveransen* in Gothenburg (Katsela & Browne, 2019) or *Gnewt Cargo Electric Vehicle Trial* in London (Leonardi et al., 2012).

Consolidation linked to a consolidation centre

Consolidation linked to physical infrastructure is related to establishing an urban consolidation centre (UCC) and, in connection with the UCC, setting up delivery services for the last mile. There are different types of UCCs, as the concept implies the establishment of an accessible logistics hub for goods that are designated for usually heavily congested urban areas to facilitate last-mile deliveries (Kin et al., 2016). The idea is to reduce goods movement traffic by consolidation of the consignments at a logistics hub and conduct the final distribution with a single transport company (in many cases, a neutral transporter). The transporters benefit by not needing to drive into the congested areas; thus, they save a lot of time and often fines for stopping and unloading in restricted areas. However, it is expected that these transporters pay for the last-mile delivery from the UCC to the transporter that operates the last mile. UCCs provide several social and environmental benefits, such as decreasing traffic congestion and reducing harmful emissions. However, despite such significant environmental and social benefits, few UCCs have been reported to be successful (i.e. financially self-sufficient) over a longer period (Holguín-Veras et al. 2020a; Marcucci & Danielis, 2007; Quak et al. 2020). Several reasons have been proposed to explain the challenge of longer-term operations for a UCC. One of the main points is that the start-

up and running costs for UCCs are relatively high, thus there may be a reluctance to meet these on-going costs (Kin et al., 2016). Many transport operators are reluctant to change their habitual ways of working and refuse to share their revenues for transport services (Holguín-Veras et al., 2020a). In many big and busy cities, the cost of a square metre of urban space is seen as too high to be used for distribution activities, resulting in potential problems in finding suitable space (Browne et al., 2005; Quak & Tavassi, 2011; van Rooijen & Quak, 2010). To achieve financial stability, UCCs have to attract a sufficient number of participants and scale up operations by, for example, establishing franchises in several cities nationwide or adding additional services for customers (Kin et al., 2016; Quak et al., 2020). A universally viable business model for UCCs is yet to be found, and it seems that supportive incentives or regulations may also be required (Holguín-Veras et al., 2020a).

Consolidation through behavioural changes

Consolidation through behavioural changes includes activities that imply the implementation and use of collaborative procurement schemes, demand-planning activities and goods consolidation that should lead to the consolidation of deliveries (Verlinde et al., 2012; Holguin-Veras et al., 2015; Holguín-Veras et al., 2020a). For the demand from goods receivers, the transporter can consolidate goods at its facilities. Another option is the transporter can deliver the goods to several customers located nearby rather than delivering to each customer separately (ibid). One more option could be so-called bundled procurement, or collaborative purchasing, when goods receivers decide to order standard goods together and receive the goods in one consignment (Verlinde et al., 2012). Another example is the Swedish SMILE project, which has commonly operated a web-based food logistics system that connects and arranges deliveries between smaller regional food producers and purchasers (CIVITAS SMILE). Demand consolidation is another measure that can decrease delivery trips by the better planning of demand for recurrently ordered goods, such as stationary and even food (Holguin-Veras et al., 2016). Such measures are used by certain public procurement establishments and facility management companies (Björklund & Gustafsson, 2015). The study on receiver-led consolidation shows that goods receivers benefit by better

service and less time spent for goods receiving activities, such as signing for packages delivered (Holguín-Veras & Sánchez-Díaz, 2016; Holguín-Veras et al., 2016).

3.3 Stakeholders in urban freight transport⁸

As mentioned in the introduction to the kappa, engaging stakeholders is critical to foster a transition to a more sustainable urban freight transport sector. It is necessary to define who is considered to be a stakeholder in urban freight transport. In the literature, researchers have indicated different groups, organisations and people that participate in urban freight transport, referring to them as participants, stakeholders and actors. For example, in his book, Ogden (1992) identified shippers, receivers, forwarders, trucking firms, truck drivers, terminal operators and firms in other modes of transport, impactees, road and traffic authorities, and governments as participants or “actors” in urban freight transport. Russo and Comi (2011) identified three stakeholder groups that should be regarded in the context of urban freight transport: 1) end-consumers, including inhabitants and visitors; 2) logistics and transportation operators, including shippers, transportation companies and receivers; and 3) public administration, including both national and local governments. Taniguchi et al. (2001) and Taniguchi and Thompson (2014) defined four key stakeholders involved in urban freight transport: shippers (manufacturers, wholesalers and retailers), residents (consumers), freight carriers⁹ (transporters and warehouse companies) and administrators (national, state and city level).

The European Commission Study on Urban Freight Transport (DG Move, 2012) proposed an extended classification of stakeholders and their main interests in urban freight (see Table 8), which was elaborated from Maggi (2007). It is seen from the table that receivers and consumers are included

⁸ There was a short discussion about stakeholders in Chapter 1 Introduction. This section provides the extended version of this discussion.

⁹ The terms carriers, transporters and transport operators are used as synonyms and are interchangeable

in the supply chain stakeholders, and residents and visitors belong to the group of other stakeholders.

Table 8. Stakeholders and interests in urban freight transport (source: DG Move, 2012)

Category of stakeholders	Stakeholders	Main interest in context of UFT
Supply chain stakeholders	Shippers	Delivery and collection of goods at the lowest cost while meeting the needs of their customers.
	Transport operators	Low cost but high-quality transport operations and satisfaction of the interests of shippers and receivers.
	Receivers (major retailers, shop owners, etc.)	On-time delivery of products, with a short lead-time.
	Consumers	Availability of a variety of goods in shops in the city centre.
Resource supply stakeholders	Infrastructure providers	Cost recovery and infrastructure performance.
	Infrastructure operators (managers)	Accessibility and use of infrastructure.
	Landowners	Profitability of local areas.
Public authorities	Local government	Attractive city for inhabitants and visitors, with minimum inconvenience from freight transport while also having effective and efficient transport operations.
	National government	Minimum externalities from freight transport while maximising economic efficiency and effectiveness.
Other stakeholders	Other economic actors located in urban areas (manufacturers, service providers, etc.)	Site accessibility and on-time deliveries.
	Residents	Minimum inconvenience caused by UFT
	Visitors, tourists	Minimum inconvenience from UFT and a wide variety of products in shops

As previously mentioned, Ballantyne et al. (2013) accentuated the difference between stakeholders and actors, classifying participants in UFT as stakeholders or actors depending on their relations to UFT—whether they have direct or indirect interests or influences on urban freight

transport (Fig 2). Ballantyne et al. (2013) defined stakeholders in city logistics in this way: “...all that have an interest in the system of urban freight transport (individuals, groups of people, organisations, companies, etc.); whereas actors are those that have a direct influence on the system. Therefore, all actors are stakeholders, but not all stakeholders are actors.” (Ballantyne et al. 2013, p. 98). The authors defined the following key group as actors: i) shippers (senders, consignors, drivers, own-account transport), ii) freight transport operators (3PLs, hauliers, drivers of vehicles, construction logistics transport, maintenance and service transport), iii) customers (citizens and visitors as end consumers, consignees) and iv) authorities (local authorities, central government). Stakeholders in urban freight belong to the following categories of participants (Ballantyne et al., 2013): i) vehicle manufacturers, ii) public transport operators, iii) property owners and landowners, iv) trade associations, v) commercial organisations, vi) citizens and visitors (other than goods receivers).

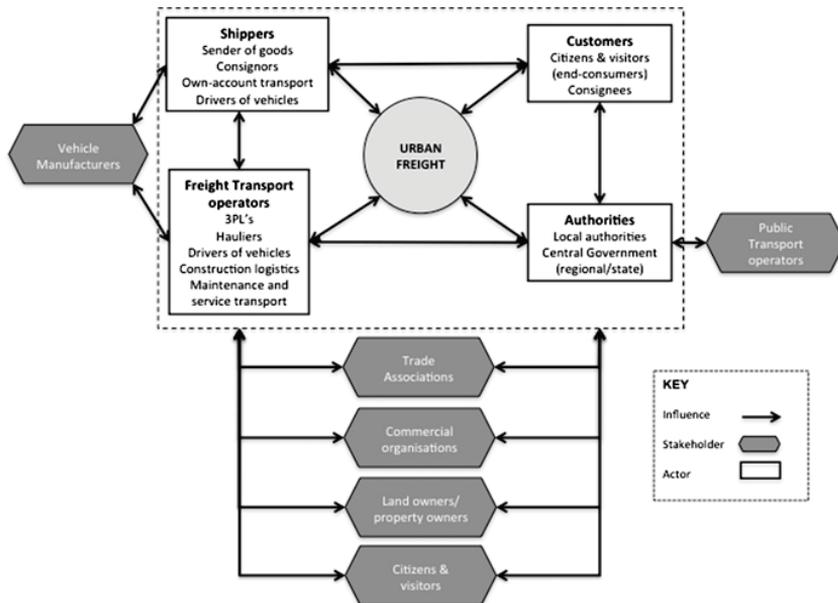


Figure 2. Stakeholders' identification framework for urban freight transport (source: Ballantyne et al., 2013).

In the research reported in this thesis, a broad definition of the term stakeholders was adopted. It refers to people and organisations that participate in UFT in different forms, can impact and become impacted by UFT or have some interest in UFT. The terms stakeholders and actors are used interchangeably in this thesis.

Complexity of stakeholders in urban freight

The literature shows that urban freight is characterised by a variety of stakeholders that are often fragmented and tend to have contradictory interests in city logistics (Ballantyne et al., 2013; Macharis et al., 2012; Teo et al., 2014; Österle et al., 2015). This complexity of interests makes it difficult to address by authorities or other policymakers, who themselves are stakeholders. Moreover, the complexity and fragmentation of the urban freight transport industry separates stakeholders from each other. As a result, they often create strategies and follow their interests without taking other stakeholders into account. This makes it difficult for stakeholders to create a concordant strategy that would simultaneously favour everyone and lead to more sustainable urban freight transport.

The importance of considering the opinions and rationales of each group of stakeholders (or those that are important in a particular setting) has been acknowledged by many scholars, even though stakeholders' rationales often contradict one another (Stathopoulos et al., 2012; Holguín-Veras, Amaya, et al., 2015). Numerous researchers have proposed various ways to take the opinions of different stakeholders into account during the planning process, implementation stage or governance in general, proposing a variety of tools to find optimal solutions and reach a consensus between the stakeholders (Macharis et al., 2012; Teo et al., 2014; Österle et al., 2015). From the stakeholder theory perspective, the power aspect between the stakeholders should be considered, as well: not all stakeholders are equal, thus not all the opinions should be equally considered (Parmar et al., 2010). However, the approaches whom to consider an important stakeholders may vary and change over time, depending on the socio-political and cultural norms established in a certain city or country. Moreover, ignoring a certain non-influential group of stakeholders can lead to undesirable and unpredictable consequences in

the form of protests or sabotage of certain rules. Therefore, the approaches to this stakeholder power aspect vary between the researchers as demonstrated below.

The heterogeneity of stakeholders and their interests implies that reaching a consensus is likely to be difficult. One approach is to try to consider all interests of all stakeholders and then try to find the best possible solution. Some of these methodologies include the Multi-Actor Multi-Criteria Analysis (MAMCA) proposed by Macharis et al. (2012), the Multi-Agent System (MAC) by Teo et al. (2014) and structured participatory process (Le Pira et al., 2017; Le Pira, Marcucci et al., 2017). Another approach is to engage the most important stakeholders in the decision-making and project development processes during the early stage, with an emphasis on the importance of collaboration, partnership and coordination (Lindholm & Browne, 2013; Behrends et al. 2008; Banister 2008). An example of this type of collaboration may be considered the freight quality partnerships and freight networks in Europe and the freight advisory committee in the US (Holguín-Veras et al., 2020a).

Freight partnerships (or networks) have been proposed as one possibility to involve stakeholders in urban freight transport planning. Freight partnerships can play a significant role in addressing urban logistics and freight transport problems and bringing fragmented stakeholders together (Browne et al., 2019). Freight partnerships bring private stakeholders, academics and local authorities together to exchange views about the urban freight state of art; they also provide the possibility for the parties to influence the decision-making process of other stakeholders by offering their perspectives on certain freight-related matters (Allen et al., 2010; Lindholm & Browne, 2013).

To sum up, urban freight transport is characterised by the diversity and complexity of stakeholders that have different impacts on urban freight activities. The research on stakeholders and their engagement in urban freight is essential to advance a transition to more sustainable goods deliveries. It is fundamental to understand how business and commercial activities are related to freight movement patterns and supply chains that provide goods and services in cities. Much of the research in UFT has been

dedicated to the stakeholders that are directly associated with goods deliveries in cities (e.g. carriers, goods receivers, shippers) and those that can exert a certain regulatory power over these goods deliveries, such as local authorities and other regulatory institutions. The role of these stakeholders is clearly important, because these stakeholders play an important role in the supply chain and in goods deliveries. At the same time, it is important to look beyond the existing research patterns in stakeholder research in urban freight (which often focus on carriers, good receivers, shippers and regulators) and explore the role of other stakeholders that can influence urban freight and investigate their ability to facilitate changes to more sustainable urban freight transport.

4 Summary of appended papers

This chapter provides summaries of the appended papers with a strong focus on the scope of findings reported in each paper. The papers were designed to facilitate the answering of the research questions. The papers share the common topic but address different cases and use different research techniques: They all focus on exploring the ability of organisations other than senders, carriers, receivers, and regulators to facilitate and promote change in urban freight transport to be more sustainable. Various measures and initiatives that were promoted or could potentially be implemented by these organisations have been explored through the lens of the Industrial Network Approach, i.e. viewing organisations and their relationships as an interconnected and constantly developing business network.

Paper 1

Brettmo, A., & Williamsson, J. (2020). The Role of ‘Influencers’ as Drivers of a More Sustainable Urban Freight Sector. *Sustainability*, 12(7), 2850.

Paper 1 introduces and defines the concept of organisations (other than carriers, shippers, receivers or regulators) whose activities have an impact on the sustainability of urban freight; these organisations have been grouped together and labelled in this thesis as influencing organisations or influencers. In relation to the key players in the supply chain (actors), these remote stakeholders are indirect in the sense that they are not directly responsible for sales, transportation or ordering the products. These organisations influence other actors such as goods receivers (and other stakeholders) regarding how they organise their logistical flows and procurement practices. The conceptualisation of influencers that exert an influence on how small goods receivers, in particular, may operate and arrange their logistics-related activities and indirect influence on the supply chain is presented in Figure 3.

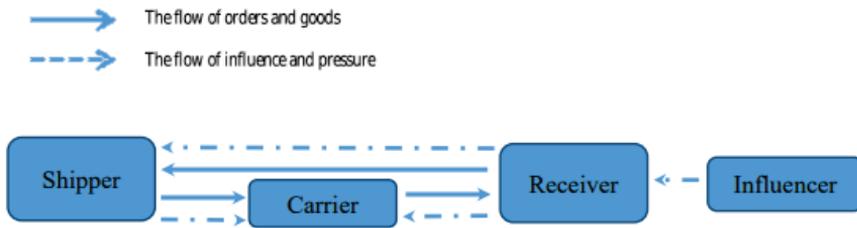


Figure 3. The influencers' role in relation to the supply chain actors.

In Figure 3, the solid lines represent the flow of orders and goods, and the dotted lines represent the flow of pressure or influence. Note that the model in Figure 3 is intentionally simplified: While the pressure is shown as being unidirectional, the interaction between the receivers and influencers is likely built on negotiation and involves the demands of many types of stakeholders. A chain of events is expected to occur in the supply chain if the receiver's logistical preferences change. The changes will start with the modification of current legal and contractual agreements between the receivers and the shipper. Then, the shipper changes the requirements on how the carrier should provide the transport service. The receiver also may directly put pressure on the carrier despite not having a direct contractual relationship, for example, by establishing the timetable for deliveries or delivery time "windows". Consequently, the development of pressure is a complex and poorly understood process in UFT, and this research contributed to defining the framework within which potential influence would be expected. In this paper, four types of organisations were identified as active in the urban freight transport setting and later grouped together and labelled as influencing organisations: BIDs and similar organisations, property owners of commercial properties, facility management companies (FMCs) and public procurement organisations (PPOs).

As the next step, the research identified the main freight-related activities that these organisations engage in and explored their role in promoting sustainable urban freight transport initiatives among goods receivers (which are their customers or members). Paper 1 includes an analysis of how the business models of transporters become affected by various measures and initiatives that aim to enhance urban freight sustainability

and are fostered or promoted by these organisations. The analysis reported in this paper showed that the business models of the transporters were primarily affected by three types of initiatives promoted by the influencers: (i) use of greener vehicles, (ii) consolidation by means of implementing a UCC and (iii) consolidation brought about by operational and behavioural change e.g. collaborative procurement.

The results reported in this paper showed that i) influencers impact the supply chain, in particular, goods receivers, and eventually the transporters; ii) transporters experience significant pressure (evidence from the business model analysis), which may be an explanation of why the industry or certain key actors are reluctant to change. However, the transporters cannot be held accountable for and bear all costs of the reorganisation and improvements to the logistics and transport chain connected with urban freight deliveries. The results highlight the often-overlooked power of influencing organisations in relation to other stakeholders in the urban freight supply chain, showing the potential for changes as well as the tensions that can arise from the use of this power.

Paper 2

Brettmo, A., & Browne, M. (2020). Business Improvement Districts as important influencers for changing to sustainable urban freight. *Cities*, 97, 102558.

Paper 2 explored the particular role and influence of Business Improvement Districts (BIDs) in fostering sustainable urban freight transport initiatives. The research purpose was to explore and compare BIDs as organisations, gain an understanding of their awareness of urban freight issues, understand their current and planned activities that can lead to a more sustainable goods movement, and try to provide insights into which factors are decisive in their achievements in promoting more sustainable urban freight solutions among their members. A selection of BIDs in three countries was chosen for case building: USA, UK and Sweden. The results show that BIDs are powerful organisations that value environmental, economic and social sustainability development in their neighbourhoods. They are driven by competition and seek to bring

additional value to their members and increase the attractiveness of their neighbourhoods. They have high awareness about the externalities brought by extensive freight traffic and may be willing to engage in various sustainable freight transport initiatives. BIDs tend to have a good dialogue with the local authorities, who, in turn, listen to them, as well. BIDs have a good reach and influence over their members; they can serve as a platform that unites members in terms of their joint operations and give their members power through the scope of collective actions that can change things for the better. Some of the studied BIDs focus on initiatives that lead to more sustainable urban deliveries, including consolidated deliveries, green deliveries using fewer logistics providers, off-hour deliveries, joint procurement, and collaborative waste management and recycling. These activities lead to a reduction of delivery trips, thus contributing to decreased traffic congestion; air quality improvements; and noise reduction.

The level of implementation of freight transport-related activities varied among the BIDs studied. It was identified that the differences in achievements lie in their motivation level, the level of awareness of the BIDs' management teams and members, and support from the public authorities (in particular, support for transport and freight-related initiatives). An additional important motivator for some BIDs was the concern about poor air quality in the city, which was a preoccupation for residents and visitors in the neighbourhood. The BIDs that engage in sustainable urban freight transport initiatives can serve as a role model to other BIDs that could be involved in a similar manner. BIDs unite and reach out to many fragmented goods receivers that are often unaware about the negative effects of their commercial activities. Therefore, the measures and support from the authorities about improving urban freight transport may have a much more substantial return on investment (administrative efforts and financial investments) in the form of sustainable improvements when directed to BIDs instead of single businesses and organisations.

Paper 3

Brettmo, A., & Sanchez-Diaz, I. (2021). Property Owners as Possible Game Changers for Sustainable Urban Freight Research. Submitted to *Research in Transportation Business & Management*.

Paper 3 focused on property owners and their role in encouraging initiatives that lead to more sustainable urban freight delivery practices. This paper studied the delivery patterns to a centrally located shopping mall in the city of Gothenburg and identified how property owners could influence the delivery patterns of their tenants. The empirical part provides a quantification and assessment of the freight transportation to the commercial tenants of the mall, followed by an analysis of the data and an identification of the initiatives that the property owners could facilitate and implement depending on the business sector and the way the deliveries to the establishments are organised. The results show that the establishments of the mall have different freight patterns in terms of the freight trips generated, control over the deliveries, fragmentation of the transporters used for the deliveries and the types of goods received. Thus, the property owner could implement a variety of strategies and measures directed to different groups of establishments. In addition, many of the measures would not require significant investments or dramatic changes in the businesses' replenishment policies and could be grouped around behavioural changes and changes in supply chain ordering and delivery practices and communication.

The research proposed a focus on offices, as this group of establishments was numerous, generated many freight trips, had limited control over receiving these deliveries and had goods delivered by many transporters. Surprisingly, the research showed that, although the offices did not sell anything, they were large and somewhat chaotic freight trip generators and were probably unaware about the negative effects that were produced by their ordering and goods receiving practices. One of the most important arguments presented in the discussion part of the paper was that, in case of a shopping mall, the decisions made by one property owner could affect freight-related strategies and, thus, outcomes in the form of freight transport demand for several hundred businesses located in the shopping centre.

Paper 3 also included a literature review on how sustainability improvements are tackled by property owners. The research on property owners shows that they are motivated to improve their properties through sustainability improvements, being incentivised by pursuing market value growth for their properties, financial performance of lease and operation costs, and brand enhancement, among other factors (Kucharska-Stasiak & Olbińska, 2018). Excessive freight transport has detrimental effects on neighbourhoods and, thus, indirectly on property market values. The results of the study show that property owners can include freight deliveries in their sustainability strategies by focusing on fostering collaboration and communication between tenants and promoting supply chain strategies that consider the types of activities that take place and the scope to reduce the number of truck movements while maintaining efficient and sustainable goods deliveries.

Paper 4

Brettmo, A. (2021). Longitudinal study on urban freight sustainability initiatives: Two cases from Sweden. Submitted to *Research in Transportation Economics*.

Paper 4 studied two cases of consolidating initiatives where the property owners played an important role together with other stakeholders. Empirical material for the cases was collected and analysed by using the Actor-Resource-Activity (ARA) model within the Industrial Network Approach (INA), using interviews with the representatives from the main stakeholders as the data collection method. The study described the main stakeholders (actors) of these two cases, their organisation, operations, resources, activities and the inter-organisational relationships between the actors. The purpose of the analysis was to understand how resource constellation and activity patterns in the cases become affected and change when new consolidating schemes are implemented. The analysis of the schemes showed that the heaviness of the existing resources and the developed interdependencies of activities indicate points in the network where changes are difficult to realise. As such, property owners may serve as outside influencers that could help to overcome the heaviness of the

resources and the interdependencies of activities that exist in the business networks of urban goods deliveries and facilitate the transition to a more sustainable urban freight sector.

The studied consolidating schemes differ from each other by their operations, the set of stakeholders involved, how the consolidating schemes were initiated and their final goals. However, at one level, these cases are extremely similar. The results and analysis of both cases show that the main stakeholders possess comprehensive, far-reaching knowledge about their own businesses, have a good understanding about freight transport business, in general, and pay a lot of attention to the sustainability aspects of their businesses. They also show a high level of awareness of the importance of moving to more sustainable goods deliveries and the necessity to look beyond existing practices. The motivation behind this is not only to do the “right” things but to also meet future requirements and stay competitive in the market.

Consolidating deliveries in urban areas is an important measure that can make urban deliveries more sustainable. The research demonstrated that property owners could take the initiative and join collaborations with other stakeholders to establish consolidation schemes that may eventually lead to a sustainable improvement in freight transport in terms of fewer freight trips, fewer CO₂ emissions, less noise and less traffic congestion. Stakeholders’ maturity, situational awareness and ability to influence goods deliveries are important aspects that should be considered to make urban freight more sustainable. In the cases studied in Paper 4, property owners showed a high awareness of their own businesses, the businesses of transporters and other stakeholders, and the negative impacts created by extensive freight transport. One of the arguments that can be concluded based on the study is, without support from property owners, none of the consolidation initiatives in cities would be possible to implement.

5 Addressing the research questions

This chapter addresses the research questions of this thesis and provides condensed answers to each one. This chapter also provides an explanation of the trajectory of this research, clarifying the rationale behind the decision to focus mostly on two types of organisations during the research process.

The purpose of this PhD thesis was to identify and study organisations (other than carriers, goods receivers, shippers and regulators) that can have an important influence on urban freight transport, explore how these organisations can promote changes in urban freight transport to be more sustainable and through what measures, and understand what characteristics of these organisations may play an important role in extending sustainable urban freight transport initiatives. Based on the research purpose, this study was built around three research questions that are going to be addressed below.

RQ1: In addition to shippers, carriers, receivers and regulators, which organisations have important impacts on the sustainability of urban freight transport?

The exploratory research in the earlier stage identified several types of organisations (other than shippers, carriers, receivers or regulators) that have an ability to impact sustainability development in urban freight transport by influencing the urban freight transport activities of various types of establishments (goods receivers, e.g. shops, restaurants, offices). These organisations were different in nature, as they work with various kinds of establishments and have different kinds of relationships with them. However, in a certain way, they grouped establishments together according to the services provided, activities, geographic location, or a combination of the above. During the earlier stage of the research, these organisations were grouped together and named *intermediary organisations*. This term was chosen to show their intermediate or “in-between” position towards actors with a more direct reach to the supply chain, including carriers, goods receivers, shippers and regulators. However, as the research developed and feedback was received at the mid-

term seminar, it was decided to label them as *influencing organisations*. This definition was selected to highlight their potential in relation to the impact that they can produce on the sustainability development of urban freight transport and to distinguish them from other stakeholders (i.e. shippers, carriers, goods receivers, regulators).

Influencing organisations can be defined as norm-setting organisations that are not directly involved in supply chain activities such as sending, transporting or receiving goods, but whose activities impact both the patterns¹⁰ of urban freight transport and the way in which deliveries are made in urban centres. These organisations influence other actors, e.g. establishments regarding how they organise logistical flows and procurement practices. While these organisations are different in nature, they share certain characteristics such as the ability to aggregate other actors in the supply chain, primarily goods receivers and establishments, and incite them to organise their freight flows in a more sustainable way and provide solutions to facilitate this transfer.

In this research, four types of organisations were identified, including Business Improvement Districts (BIDs), facility management companies, property owners and public procurement organisations. Business Improvement Districts (BIDs) are public-private partnerships, specifically non-profit organisations established by property owners or business owners to improve the attractiveness of a specific geographic area in ways that benefit the local business sector and increase property value. BIDs are engaged in a wide range of activities, some of which substantially impact urban freight transport. The range of activities in which BIDs engage and their level of involvement in urban freight issues depend on the context and the main stakeholders represented by the BID. BIDs unite fragmented actors, businesses and various establishments and can promote sustainable urban freight solutions among them, especially if supported by the local authorities. They are driven by competition and seek to bring additional value to their members and increase the attractiveness of their neighbourhoods. They have a high awareness of the externalities brought

¹⁰ The time of the day, grouping deliveries together

by extensive freight traffic and may be willing to engage in various sustainable freight transport initiatives.

Property owners of shopping malls and offices were identified as actors that can facilitate sustainability development in urban freight and, thus, are included in the group of influencing organisations. Even if property owners are not involved in sending, transporting or receiving goods, they have a quite central position in relation to urban freight transport. Property owners have a reach to the numerous establishments located at their facilities. Thus, they have the power to promote or even dictate to their tenants how to organise their logistics setup or the parts of the setup connected to flows in and out of the buildings. Examples of tenants that make logistical decisions are offices, restaurants and retailers. By promoting and facilitating the consolidation of flows, organising an accessible goods reception area, and extending concierge services for goods, property owners may facilitate changes in delivery routines to make them more sustainable. Property owners may, for example, persuade tenants of a multi-tenant building to use the same facility management company, thus leading to the consolidation of flows going both in and out of the building. Consequently, property owners are often aware of the negative impacts of externalities generated by urban goods movements. They also appear to understand that accessibility in the delivery of goods (i.e. goods being efficiently delivered without jeopardising air quality, safety or liveability) plays a crucial role for a well-functioning city by enhancing the quality of the area in which their property is located. This awareness is tightly linked to the interest of property owners to secure the future commercial value of their properties.

Facility management companies (FMCs) work to ensure certain standards in facility management by providing services and products to customers. FMCs often manage certain logistical flows to and from their customers, provide cleaning and catering services and, at times, even take over purchasing functions for some goods. Therefore, FMCs provide a wide range of services for their customers, and some FMCs have established a green profile by providing their customers with services that are linked to certain aspects of sustainability. The research has shown that FMCs prioritise certain environmental aspects of their operations and are striving

for continuous improvement in their environmental performance, often using environmental improvements as a marketing strategy. This allows them to position themselves in relation to competitors by adding value to their service portfolios, thus giving them a competitive edge. FMCs may act as orchestrators of logistics flows on behalf of their customers by choosing the most sustainable suppliers and optimising goods movements. In particular, by managing several customers in the same multi-tenant building or managing several buildings in a small geographical area, this category of stakeholders may have a considerable impact on large volumes of goods. However, although FMCs are willing to work to achieve sustainability, they often need support from property owners. This is especially the case when investment is needed in the property to decrease the externalities that freight movements create.

Public procurement organisations (PPOs) are organisations that have an ‘umbrella’ function, providing a frame of reference for the goods that will be delivered to public organisations such as schools or nursing homes. PPOs decide on the type and quality of products and services that should be provided to the final customers; they organise tenders, choose the suppliers and create framework agreements that stipulate how deliveries should be made. Their policies regarding the deliveries of goods can make a significant impact, leading to an improvement in urban deliveries by making them more sustainable. PPOs are cost-conscious but often motivated by social and environmental values, that is, by doing the right things in the eyes of their clients. This means that they often prioritise quality and sustainability. In addition, public budgets for procurement are significant, and the aforementioned factors open up possibilities for creating or improving the existing framework for sustainable deliveries to municipal establishments. This work cannot be expected to be done by fragmented municipal goods receivers, as they are accustomed to following the established procurement process and do not have the resources to investigate possibilities or implement sustainable improvements connected to goods deliveries on their own. As influencers, PPOs provide an opportunity to reach out to public establishments that are otherwise difficult to reach in terms of goods deliveries improvements.

RQ2: What type of measures can these organisations take, and how can they promote changing urban freight transport to be more sustainable?

The results of this research indicated that these organisations used various types of measures and engaged in several urban freight transport initiatives. The range of these measures and initiatives was wide, and their particular settings mostly depended on the type of the organisation in which they were involved and the kind of relationships with the organisations upon which they exerted their influence. The results reported in this thesis demonstrate that influencing organisations were engaged in one or more of the following initiatives:

- vehicle-related requirements such as greener vehicles, e.g. low-emission vehicles, hybrid and electrical vehicles;
- requirements to participate in (e.g. deliver to) UCC initiatives;
- demand planning;
- consolidated deliveries and collaborative procurement;
- scheduling or time-agreed deliveries, off-hour deliveries (OHD);
- common carrier locker system;
- deliveries to pick-up point;
- parking-related regulations and anti-idling programmes;
- Delivery and Servicing Planning (DSP).

The empirical results show that BIDs, FMCs and PPOs exerted their influence by promoting a range of initiatives, including demand planning, consolidated deliveries and collaborative procurement (sustainable procurement). The property owners tended to focus on reorganising and re-arranging the deliveries by, for example, engaging with urban consolidation centres (UCCs), consolidation schemes, and other similar initiatives. The summarised list of freight-related activities of organisations studied in this research is presented in Table 9.

Table 9. The list of freight-related activities initiated or supported by organisations studied in this thesis

<p>Property owners (POs)</p> <p>Participating in goods consolidation schemes; Providing commercial space for consolidation hubs, terminals; Co-establishing companies that provide sustainable logistics solutions for the area; Provision of various logistics solutions that enhance accessibility to commercial properties that attract many freight trips, for example, goods concierge services, common goods receiving storage areas;</p>
<p>Business Improvement Districts (BIDs)</p> <p>Activities that imply an engagement in joint procurement (e.g. buyers' clubs); Waste management and recycling activities; Conducting studies and giving recommendations to members; Engaging with activities that imply consolidation of incoming deliveries and/or using urban consolidation centres (UCCs); Supporting last-mile delivery schemes; Supporting and advocating heavy-vehicle entry restrictions to the area; Pedestrianisation of certain streets; Supporting commercial vehicle reductions schemes; Behaviour-changing and research activities concerning projects driven by the goal to improve air quality; Delivery and Service Plans (DSP) for buildings; Promotion of collection points; Providing consultations and recommendations on freight and traffic-related questions to local authorities; Public realm programmes; Supporting studies and programmes related to off-peak hours deliveries OHD;</p>
<p>Public procurement organisations (PPOs)</p> <p>Stipulating delivery terms for transport-intensive products; Demand plan and consolidation activities; Establishing extra delivery fees for deliveries outside the planned schedule; Optimising delivery schedules and routes; Applying coordinated deliveries; Striving for continuous transport improvements and collaborative work with municipal transport agency;</p>
<p>Facility management companies (FMCs)</p> <p>Provision of environmentally friendly facility management (green services); Provision of environmental guidance, benchmark and working framework for systematic sustainable improvements for customers; Optimising deliveries, deciding supplier routes, schedules and vehicles with environmental standards for deliveries; Planned, consolidated demands and penalties for additional ordering/deliveries; Systematic measurement and CO₂ footprint reporting (footprint produced by suppliers and FMC managers); Using vehicles that comply with environmental standards; Consolidating physical flows while providing services for customers in multi-tenant buildings;</p>

There are several ways the organisations studied in this thesis can promote these measures and initiatives among the establishments. These methods of influence can be conditionally divided into voluntary and administrative methods. Voluntary methods include persuasion, promotion and knowledge dissemination, whereas administrative methods are based on regulations and legal mechanisms. For example, BIDs use voluntary approaches, trying to persuade and educate their members as well as provide solutions that can change their freight transport flows to be more sustainable. Property owners use both voluntary methods like promotion and persuasion as well as regulatory methods based on legal and contractual relationships. Facility management companies apply marketing strategies to promote the measures and initiatives among their customers, positioning the measures as contributors to the “green profile” of their customers and the facility management company itself. Public procurement organisations mainly use administrative mechanisms based on regulatory and legal frameworks.

RQ3: What are the characteristics of these organisations that can play an important role in scaling up sustainable urban freight transport initiatives?

This thesis was focused on exploring influencing organisations and their role in promoting sustainability in urban freight transport. The findings obtained during the study suggest that influencing organisations have certain characteristics that provide an opportunity to scale up sustainable UFT initiatives and bring them to a widespread level of implementation. There are several reasons to argue for this interpretation of the findings, including the high motivation to engage in urban freight issues, possibility to reach and influence many establishments/goods receivers, administrative power in the case of public procurement organisations, and the expertise to handle and optimise multiple physical flows of various customers, as in the case facility management companies. A highly important argument is that influencing organisations provide an opportunity to implement and promote SUFTIs at the private organisation and business level (except PPOs, which provide services to public and municipal receivers); this is the essential pledge of upscaling such

initiatives from the level of pilot projects to the level of widespread business practices.

For example, in the case of a shopping mall, the decisions made by one property owner can affect freight-related strategies and, thus, outcomes in the form of freight transport demand for several hundred businesses located in the shopping centre. The property owner has the possibility to set the rules for their tenants to organise physical flows, including goods deliveries and waste management. Property owners can facilitate the transition to more sustainable practices by, for example, improving accessibility to the buildings, arranging more productive loading/unloading facilities and arranging options for consolidated goods receiving (like in the case of the Mall of Scandinavia), and establishing types of concierge services and other types of measures at a more general level. More specifically, depending on the specific freight patterns of the tenants, property owners can facilitate the implementation of the strategies, which may include influencing ordering policies, generating collaborative procurement among the tenants, inducing consolidation at the supplier level and fostering collaboration between the transporters.

Property owners are vital stakeholders in several types of freight consolidation initiatives. They provide the space for the city hubs that are crucial for consolidation schemes. In large and busy cities, space is a scarce and expensive resource (Quak & Tavassi, 2011), thus the feasibility to establish a consolidation scheme heavily depends on the willingness of the property owners to provide a suitable and affordable space for city hubs. They have knowledge about their properties and a good understanding on the desirable future development of the neighbourhoods and their properties. Unlike other service providers, property owners cannot move their properties because they physically stay at the same place. However, what they can do is improve the property itself and the area around it. In cities without support from property owners, none of the consolidation initiatives could be implemented.

In addition, an important aspect to consider is that property owners should be motivated to engage in the sustainability of freight transport questions. Property owners should be a driving force for improvements because they

are strongly interested in improving the market value of their properties (Warren-Myers, 2012). They are aware of the negative impacts created by extensive freight transport, which, in turn, have detrimental effects on the neighbourhoods and, thus, indirectly on property market value. Due to the effects of the heaviness of the resources and the interdependencies of activities, an additional impetus is needed for the transformation and adoption of new practices (e.g. consolidation schemes). As such, property owners' interest and resources can provide such an impulse to the urban freight transport setting.

In a similar manner to property owners, BIDs have a good reach and influence over their members. They can serve as a platform that unites members in terms of their joint operations and gives them power through the scope of collective actions to change things to the better. As previously mentioned, the empirical results show that BIDs are driven by competition and seek to bring additional value to their members and increase the attractiveness of their neighbourhoods. In this function, they have similar interests as property owners. BIDs have a high awareness about the externalities brought by extensive freight traffic and may be willing to engage in sustainable freight transport initiatives. From the cases studied, BIDs tend to have a good dialogue with local authorities, who, in turn, listen to them, as well. This could be an additional benefit in providing establishments with more supportive regulatory solutions.

To conclude this chapter, it is worth noting that this study has evolved over time and, thus, various decisions concerning the trajectory of the research evolution were made during the research process. The summary of the appended papers in Chapter 4 shows that, with the exception of Paper 1, the papers in this thesis mainly focused on property owners and BIDs. The rationale for that choice is presented below.

The exploratory study that was conducted at the early stage of the research identified four types of influencing organisations: Business Improvement Districts (BIDs), property owners, facility management companies (FMCs) and public procurement organisations (PPOs). The results of that study were summarised in Paper 1. However, a detailed consideration of the results led to the decision to focus on two types of organisations,

property owners and BIDs, for the following reasons. Even if it could be argued that FMCs could influence physical flows and processes connected to UFT, the results showed: i) sustainable urban freight transport initiatives were not high on their agenda, ii) the number of their sustainable urban freight transport initiatives at the time was limited, iii) and the most important, FMCs' engagement in sustainable urban freight transport initiatives heavily depended on the property owners' agenda, which, once again, pointed out where the research should be directed at that stage. The study also showed that PPOs had an influence on goods receivers but at a high and general level; at the time, it was difficult to study their influence on a more detailed scale, which was the purpose of the thesis. In contrast, the results of the study about BIDs and property owners showed that they were engaged in a variety of initiatives that could be captured on a more detailed level, thus focusing on them would contribute more to the purpose of the thesis. Considering the reflection stated above, the decision was made to focus the research on BIDs and property owners.

6 Conclusions

This chapter concludes and discusses the findings of the research in relation to the main research topics of the thesis—it highlights the potential importance of influencers in promoting sustainable urban freight transport initiatives. It also describes the contribution of the research and its practical implications, limitations and suggestions for future research.

6.1 Final remarks on social and economic sustainability in the context of urban freight transport

All three aspects of sustainability are necessary to consider when aiming to improve freight transport in cities. Much research has focused on the environmental aspects of urban freight transport, seeking to improve urban deliveries in terms of reductions in CO₂ emissions and particle pollution produced by delivery vehicles (e.g. Rogerson, 2017), use of full load capacities of the vehicles (e.g. Santén, 2017) and other vehicle-related and driving-related measures (e.g. Arvidsson et al., 2013). While such research is necessary and important, it is also crucial to consider the social and economic aspects of urban freight transport sustainability. Fulfilment of these aspects enhances the likelihood of faster uptake and the scaling up and transfer of environmentally friendly delivery practices to cities. Measures need to address the economic and social aspects of sustainability, to extend beyond the projects' implementation stage and spread over a medium and long-term period of time (this applies to consolidation schemes and other sustainable urban freight transport initiatives). If an initiative is not economically self-sufficient and requires additional external funding, then long-term survival is unlikely. Private companies cannot bear economic costs that will not be covered by the revenues obtained from their business activities. However, it is important to remember that the problem is deeper than that: In the end, the final costs produced by unsustainable freight transport, even if they are not explicitly reflected in the companies' profits and loss statement, are borne by society. A more proportionate distribution of the responsibility and the costs caused by freight transport might be a fairer solution. It would

contribute to the rearrangement and reconfiguration of existing supply chains for urban deliveries and may avoid unnecessary externalities.

Social aspects of urban freight sustainability have been addressed in the literature, but they are not usually a primary focus. However, these aspects are vital to people living in cities. As described in the Frame of reference in Chapter 3, the following aspects of social sustainability are affected by the urban freight transport context: health, security, well-being, quality of life and liveability of cities, and preserving buildings and infrastructure from damage (Quak, 2008). This research showed that influencing organisations are involved in numerous initiatives that improve the social sustainability of UFT by diminishing its negative effects. For example, it was estimated that the consolidation scheme *Älskade stad* in Stockholm brought several benefits that are mostly related to social sustainability. More specifically, the scheme resulted in a decline of the number of freight trips. Together with the use of electrical vehicles for final distributions, this led to a decrease of harmful emissions that negatively affect people's health and well-being, noise reduction, lower traffic congestion and a lower probability of traffic accidents, thus enhancing traffic safety. In a similar manner, in the case of Urban Services, concerns of property owners about the improvement of their neighbourhoods brought about positive outcomes in social sustainability, such as enhanced safety, lower traffic congestion, fewer emissions, fewer vehicles on the streets and more available open spaces.

One way to address social sustainability is to consider the motivations for property owners to improve the area around their properties. Property owners have an interest in increasing the value of their properties, thus they invest in the surrounding neighbourhoods. However, investments into the neighbourhood related to the improvement of urban freight practices also bring a number of social benefits, such as less noise, odour and traffic congestion as well as fewer traffic accidents and harmful emissions. This includes an improvement in the liveability of the area, including infrastructure improvements and enhancing the attractiveness of the neighbourhoods through increased accessibility and fostering green, pedestrian-friendly open spaces. This can be achieved by reducing the number of freight trips to and from the buildings in the area, shortening

the dwell time of delivery vehicles around the properties and investing into greening and refining the area around the properties—measures upon which property owners have a certain influence. In the same manner, BIDs work hard to enhance their neighbourhoods, and their urban freight transport-related initiatives bring social sustainability benefits along with environmental and economic benefits. Some examples of social these sustainability improvements include fewer congested and polluted streets, improved accessibility, better air quality, increased safety for cyclists and pedestrians and a more attractive and liveable neighbourhood. In the same manner, the initiatives of PPOs and FMCs that lead to fewer freight transport movements or the usage of greener vehicles for deliveries contribute to social sustainability in the cities.

However, it is important to remember that these social indicators are often tightly connected to the environmental and economic aspects of sustainability and, in many cases, should not be separated from them. An idea that was mentioned earlier in this section stated that, to scale up and implement “good for people and planet” measures on a broad, widespread basis, it is important to ensure the economic sustainability and self-sufficiency of these measures. This will encourage businesses and people to change their practices *on a daily basis*. Unfortunately, this is not the case for most innovative “green” solutions, which why the expansion of these solutions has been delayed. However, the results of this study show that this combination is possible to reach, and that desirable socially and environmentally sustainable solutions can be economically self-sufficient and even beneficial for the actors that adopt them.

Support from policymakers and public authorities is crucial, and the results from the BID and property owner studies confirms this, as well. This support has several implications. Having the authorities on their side brings additional guarantees of the longevity of the initiative or project in question, thus giving an additional assurance for the funds and resources invested into these initiatives. Moreover, decision-makers and local authorities can facilitate the resolution of certain bureaucratic or administrative barriers, for example, granting access to pedestrian streets for special delivery vehicles or arranging permission for short-term parking for delivery vehicles in select urban areas (an example was the

case of Älskade stad described in Paper 4). In addition, decision-makers sometimes control the funds to invest in sustainability improvements and environmental programmes, such as air quality or other public realm improvement programmes. Even if self-sufficiency is a fundamental factor, additional support at a certain stage could help reach the break-even point of the project. This could become the tipping point that can turn a project into a sustainable and potentially scalable solution. In the case of BIDs, these influencers also facilitate the dialogue between private business and authorities that may otherwise have few communication possibilities between one another. In these instances, BIDs, the voice of businesses, obtain additional power, as the authorities respect BIDs and consider them to be important and influential. Authorities take BIDs' opinions and proposals into account and try to meet their requests or provide additional solutions or alternatives when possible.

6.2 The potential importance of influencers in promoting sustainable urban freight transport

The research in this thesis focused on the role of organisations that can significantly contribute to sustainability development in urban freight transport. These organisations are usually not associated with key actors in urban freight transport and, thus, are not expected to have a significant impact. Indeed, these organisations are usually not tied to the physical supply chain or involved in physical handling of goods. However, these organisations share some characteristics, such as aggregating other actors in the supply chain, primarily goods receivers or establishments, which can encourage them to organise their freight flows in a more sustainable way. These organisations group establishments together according to the services provided, activities, geographic location or a combination of services and location. In this research, these organisations were identified, studied, and eventually grouped together and labelled as *influencing organisations*. This definition was chosen to emphasise the potential impact on the urban freight supply chain, showing their “intermediate” role in the supply chain and distinguishing them from other stakeholders (like shippers, carriers, goods receivers or regulators) that usually receive more attention from researchers and policymakers.

Influencing organisations engage in a wide range of initiatives. Sustainability development, especially its social and economic aspects, is often high on their agenda. These organisations have various leverage tools to promote sustainable measures: administrative power (in the case of public procurement organisations), power based on landlord-tenant relationships in competitive and attractive commercial buildings (in the case of property owners), power to orchestrate various flows, showcase the benefits of these changes to customers and help them to enhance their “green profile” or brand (in the case of FMCs), and the power of outreach and serving as a common voice for establishments, which is provided by BIDs to their members, to increase the attractiveness of their neighbourhoods and facilitate local businesses to stay competitive. Due to the pressure that these influencing organisations can place on other supply chain actors, they have a unique opportunity to enhance and scale up sustainable urban freight transport initiatives that have been proven to be acceptable in smaller test projects. This scaling up is possible by incorporating these initiatives within the private sector, serving as an orchestrator for a large number of independent businesses or steering the delivery practices of municipally owned establishments.

Part of this research focused on conducting in-depth research of organisations and their interrelations by analysing consolidation schemes (Paper 4). The INA method was applied to obtain a deeper understanding about the configuration of the business network in terms of its actors, resources and activities, as well as their interactions in consolidation schemes, to identify eventual barriers to change, which are the effects of the *heaviness of resources*¹¹ and *interdependencies of activities*¹². The results of this analysis provide insights about the potential bottlenecks to these cases, which can be projected to other similar initiatives and show the aspects that are necessary to consider when shaping changes in urban freight transport schemes.

¹¹ The attribute created by past investments when existing resource constellation impedes the evolvement of new resources in the network, such as, for example, acquiring more advanced technologies (Håkansson et al., 2009).

¹²The process in which the activities in the network adjust to each other to perform better; over time, they become interdependent and are difficult to change (Håkansson et al., 2009).

This research shows that influencers should realise their key role or special position in promoting sustainable urban freight transport initiatives and start to put more pressure on their tenants, members or other supply chain actors. The pressure can be in the form of nudging, providing information, providing incentives, coordination, direct requests or providing alternative solutions and similar measures. It is essential for influencers to understand that if they do not plan for changes today, then higher taxation levels or more regulations within cities may result in the future. One way to convince the influencers is to demonstrate that engagement in sustainable urban freight transport initiatives can be a win-win solution. Another perspective is that, in the future, certain influencers (such as property owners) may become accountable for the externalities produced by freight transport-related activities to and from their buildings and, thus, would need the knowledge and experience to resolve these issues. These are additional motivational factors for influencers to experiment with new freight transport solutions, since they can gain knowledge and experience that can be applied in the future to obtain a competitive advantage.

When analysing the work of influencers, it is essential to consider the role they play in the future trajectory of urban freight transport development. Influencers may have a greater political influence and a larger and more diverse resource base than other supply chain actors. As some influencers are involved in the early stages of various projects, such as building- or infrastructure-related projects, they can voice the concerns and requirements of the community members they represent. This also means that the influencers would be active during more phases associated with the development and management of the urban community, giving them more weight than expected when considering their lack of direct presence in the supply chain. Influencers may support sustainability in ways that are impossible for supply chain actors such as receivers or transporters. The involvement of influencers can provide urban freight transport sector with longer-term perspectives on issues associated with freight deliveries because freight issues can be considered and included within the strategic plans for property or neighbourhood development.

6.3 Contribution of the research

This study contributes to the existing body of research about sustainable UFT, as all three aspects of sustainability in urban freight transport are considered and addressed. In particular, this contributes to the broader research about stakeholders in UFT. While much research about stakeholders already exists, a lot of the literature is focused on transport operators, policymakers and, more recently, different groups of goods receivers. Although that research is important and necessary, this thesis brings attention to another group of stakeholders—*influencers*—that are essential but have not been closely studied in UFT research. This thesis contributes to the body of literature by defining influencers as a group of stakeholders among other stakeholders, exploring why they are important and what may be their motivation to engage in UFT matters. The research describes their attitude towards and level of awareness of UFT, including an assessment of the initiatives in which they engage or potentially could be engaged. This assessment is further extended to consider the mechanisms whereby influencers shape the changes and future development of sustainability in UFT, highlighting the possibility of scaling up sustainable initiatives and practices to be more commonly accepted and applied.

Next, this thesis expands the literature on the different kinds of sustainable urban freight transport initiatives that have been tested or implemented by organisations in various countries. In these examples, the initiatives were started or supported in some way by the influencers, including BIDs, property owners, PPOs and FMCs. The description of these initiatives adds to the record of measures that have been tried and applied in several places and the accumulated knowledge about the outcomes of these measures. This contributes to the knowledge dissemination about the measures that have been tested and implemented in UFT around the world.

In this thesis, several projects such as the consolidation initiatives in Stockholm were thoroughly described, mapped and analysed through the application of the Actor-Resource-Activity (ARA) model within the Industrial Network Approach. The application of ARA structured the research at the data collection phase. This analysis enabled deeper insights

into the process of setting and running the consolidation schemes, establishing stakeholder involvement and interaction during the process and identifying the main constraints or bottlenecks in the projects. In particular, the research showed that the transporters' resource structure and activity patterns experienced high pressure during the changes to the new schemes. The transporters' difficulty to change had been previously expressed by various stakeholders in different forums, but the analysis showed exactly how their resource and activity structures are affected and revealed why they struggle to overcome the heaviness of resources and interdependencies of activities on their own. This analysis shed light on the ways in which influencers can help overcome the heaviness in networks to facilitate change.

The important contribution of this thesis is that the research focused on finding feasible possibilities to scale up sustainable urban freight initiatives and reach many goods receivers. This is the connecting thread of the research on influencers: They have a reach to many goods receivers, leverage to influence and possibly unite the goods receivers, available resources to invest into new infrastructural solutions or processes, and motivation and incentives to implement these tasks. Furthermore, their engagement can be beneficial both for their own needs as well as the sustainability development in cities. The proposal to focus efforts to encourage influencers to improve UFT to a scalable level is the contribution of this thesis.

6.4 Implications for practitioners and policymakers

There are several practical implications of this research. The results of this thesis provide indications for policymakers about forming policies and regulations to stimulate influencer engagement in UFT. When creating a strategy or action plan that aims to improve urban freight transport, a special focus should be on influencers to involve them from the beginning and incentivise them to engage more actively in the initiatives. Providing support to influencers would encourage them to take more substantial steps towards promoting sustainable urban freight transport initiatives and implementing more sustainable UFT practices among the organisations

upon which they exert an influence. Targeting influencers in various freight transport improvement programmes funded by governmental or international institutions could bring much more substantial outcomes to sustainability improvements in urban freight transport.

This research provides insights for influencers to comprehend their role in possibly changing urban freight transport to be more sustainable. This thesis contributes to their awareness about the importance of considering urban freight transport matters and the possible benefits to gain from including UFT topics in their agenda. This research gives the influencing organisations an additional stimulus to incorporate urban freight transport topics in their sustainability strategies at an organisational level and determine an action plan to bring sustainable urban freight transport initiatives into reality. This research shows to influencers that they have the power and unique position to act as game changers in promoting sustainable UFT because of their uniting position and direct reach to numerous goods receivers, such as BID members or tenants of a shopping mall or office building.

6.5 Limitations and directions for future research

Although one should be cautious to make generalisations based on a small, heterogeneous sample, this thesis presents findings that may indicate promising pathways for future research. While the agenda and engagement in UFT topics may vary, the organisations studied are present in many cities around the world. While the results of this research can be used in other parts of the world, contextual differences should be taken into consideration, such as cultural differences, differences in business frameworks and relationships between stakeholders as well as differences in regulations and policies. Therefore, some of the findings are particular to the Swedish environment. It is necessary to note that not all influencers will be interested in the sustainability issues of urban freight transport. There is a need to understand the incentives and interests of influencers in other places to become involved in UFT sustainability issues, as some might be similar to the ones identified in this research and others may contradict. The literature suggests that although stakeholders in cities and

countries with different cultural and political setups have contradicting interests (Stathopoulos et al., 2012), their perceptions about transportation and urban freight transport are similar (Lindholm & Behrends, 2012). Furthermore, policymakers and authorities that want to promote sustainable UFT can support and incentivise the level of awareness about sustainability issues and the power that influencers have over other stakeholders.

Future research may expand on the classification of influencing organisations, assess their activities and add recommendations for stakeholders and policymakers that are interested in fostering sustainable urban freight transport systems. By taking these steps, it would be possible to develop a richer understanding of how influencers may facilitate sustainable delivery practices.

Offices are important and plentiful establishments within cities; in many cases, they generate many freight transport trips every day. Therefore, future research that aims to study office ordering and delivery practices is suggested. For example, measures aimed to improve ordering and goods delivering practices in offices could be drafted and preliminarily tested through a survey of office tenants.

Another direction of future research could focus on the inclusion of freight transport assessments in building certification. Currently, the certification systems used for building evaluations in Sweden do not contain an assessment of goods deliveries to and from buildings. Moreover, freight transport is not a part of certification schemes at all. However, this can be changed, and a goods delivery assessment can be added to the certification schemes, as some certification systems already include transport themes in the evaluation but with a focus on transportation for employees and residents. The output from the proposed research may have a major impact to encourage commercial property owners to influence their tenants to adopt sustainable freight practices. This, in turn, would be an important step towards scalable changes in this field.

References:

- Abbasi, M., & Nilsson, F. (2012). Themes and challenges in making supply chains environmentally sustainable. *Supply Chain Management*, 17, 517-530.
- Allen, J., Browne, M., & Woodburn, A. (2014). *London Freight Data Report: 2014 Update*. Retrieved from <http://content.tfl.gov.uk/london-freight-data-report-2014.pdf>
- Allen, J., Browne, M., Piotrowska, M. and Woodburn, A.G. 2010. *Freight Quality Partnerships in the UK: an analysis of their work and achievements*. Green Logistics Report, University of Westminster.
- Allen, J., Browne, M., Woodburn, A.G. and Piotrowska, M. (2008). London freight data report. Technical Report. Transport for London, London.
- Alvbåge, V., Cederqvist, M., Welander, D., Bai, W., Ericsson, R., & Zingmark, W. (2020). *Potentialen hos konsoliderade logistikflöden i urbana områden*. Kandidatarbete inom Industriell ekonomi. Chalmers Tekniska Högskola. <https://hdl.handle.net/20.500.12380/301472>
- Alvesson, M. & Sköldberg, K. (2018). *Reflexive methodology: new vistas for qualitative research*. (Third edition). Los Angeles: Sage.
- Anand, N., Yang, M., Van Duin, J., & Tavasszy, L. (2012). GenCLON: An ontology for city logistics. *Expert Systems with Applications*, 39(15), 11944-11960.
- Anderson, S., Allen, J., & Browne, M. (2005). Urban logistics—how can it meet policy makers' sustainability objectives? *Journal of Transport Geography*, 13(1), 71-81.
- Andriof, J., & Waddock, S. (2017). Unfolding stakeholder engagement. In *Unfolding stakeholder thinking* (pp. 19-42). Routledge.
- Arvidsson, N. (2013). Essays on operational freight transport efficiency and sustainability. Doctoral thesis in Business Administration. Göteborg: School of Business, Economics and Law, University of Gothenburg.
- Arvidsson, N., Woxenius, J., & Lamngård, C. (2013). Review of Road Hauliers' Measures for Increasing Transport Efficiency and Sustainability in Urban Freight Distribution. *Transport Reviews*, 33(1), 107-127. doi:10.1080/01441647.2013.763866
- Baines, C. (1999). *Background on urban space*. Paper presented at the Proceedings of the Scottish Urban Open Space Conference. Scottish Natural Heritage/Dundee City Council, Dundee.

- Ballantyne, E. E., Lindholm, M., & Whiteing, A. (2013). A comparative study of urban freight transport planning: addressing stakeholder needs. *Journal of Transport Geography*, 32, 93-101.
- Balm, S., van Amstel, W. P., Habers, J., Aditjandra, P., & Zunder, T. H. (2016). The Purchasing Behavior of Public Organizations and its Impact on City Logistics. *Transportation Research Procedia*, 12, 252-262.
- Banister, D. (2008). The sustainable mobility paradigm. *Transport Policy*, 15(2), 73-80. doi:<https://doi.org/10.1016/j.tranpol.2007.10.005>
- Baudel, T., Dablanc, L., Alguiar-Melgarejo, P., & Ashton, J. (2016). Optimizing Urban Freight Deliveries: From Designing and Testing a Prototype System to Addressing Real Life Challenges. *Transportation Research Procedia*, 12, 170-180. doi: <https://doi.org/10.1016/j.trpro.2016.02.056>
- Behrends, S., Lindholm, M., & Woxenius, J. (2008). The Impact of Urban Freight Transport: A Definition of Sustainability from an Actor's Perspective. *Transportation Planning and Technology*, 31(6), 693-713. doi:10.1080/03081060802493247
- Berger, P. L., & Luckmann, T. (1967). *The Social Construction of Reality: A Treatise in the Sociology of Knowledge*: Open Road Integrated Media, Inc.
- BESTFACT. (2014). Best practice factory for freight transport. Green Logistics & Co-Modality. Retrieved from http://www.bestfact.net/best-practices/cl2_greenlogistics_comodality/
- BESTUFS. (2007). Good Practice Guide on Urban Freight Transport. Retrieved from http://www.bestufs.net/download/BESTUFS_II/good_practice/English_BESTUFS_Guide.pdf
- Björklund, M., Gustafsson, S., (2015), Towards sustainability with the coordinated freight distribution of municipal goods, *Journal of Cleaner Production*, 98, 194-204. <https://doi.org/10.1016/j.jclepro.2014.10.043>
- Blumberg, B., Cooper, D., & Schindler, P. (2008). *Business research methods: second European edition*.
- Brettmo, A., & Browne, M. (2016). *An exploratory study of the scope for receivers to influence urban freight consolidation through changes in their procurement practices*. Paper presented at the Logistics Research Network Conference (LRN) 2016, University of Hull, UK.
- Brettmo, A., & Browne, M. (2020). Business Improvement Districts as important influencers for changing to sustainable urban freight.

- Cities*, 97, 102558. doi:
<https://doi.org/10.1016/j.cities.2019.102558>
- Brettmo, A., Browne, M., Holguín-Veras, J., Wojtowicz, J., & Allen, J. (2017). *The role of intermediary organisations in influencing urban deliveries to receivers/establishments*. Paper presented at the International City Logistics Conference 2017, Thailand.
- Browne, M., Allen, J., & Anderson, S. (2005). Low emission zones: the likely effects on the freight transport sector. *International Journal of Logistics: Research and Applications*, 8(4), 269-281.
- Browne, M., Allen, J., Woodburn, A., & Piotrowska, M. (2007). Literature review WM9: part II-light goods vehicles in urban areas. *Transport Studies Group, University of Westminster*.
- Browne, M., Brettmo, A., & Lindholm, M. (2019). Stakeholder engagement and partnerships for improved urban logistics, pp 257-273. In Browne, M., Behrends, S., Woxenius, J., Giuliano, G. and Holguin-Veras, J. [Eds] (2019) *Urban Logistics: Management, policy and innovation in a rapidly changing environment*, Kogan Page, London, ISBN 97809749478711.
- Bryant, C. G. A. (1985). *Positivism in social theory and research*. London: Macmillan.
- Bryman, A., & Bell, E. (2007). *Business Research Methods*: Oxford University Press.
- Brundtland, G. H. (1987). Our common future: The World Commission on Environment and Development. Oxford, England.
- Butrina, P., del Carmen Girón-Valderrama, G., Machado-León, J. L., Goodchild, A., & Ayyalasomayajula, P. C. (2017). From the Last Mile to the Last 800 ft: Key Factors in Urban Pickup and Delivery of Goods. *Transportation Research Record*, 2609(1), 85-92.
- Cattaruzza, D., Absi, N., Feillet, D., & González-Feliu, J. (2017). Vehicle routing problems for city logistics. *EURO Journal on Transportation and Logistics*, 6(1), 51-79. doi:<https://doi.org/10.1007/s13676-014-0074-0>
- Chen, Q., Conway, A., & Cheng, J. (2017). Parking for residential delivery in New York City: Regulations and behavior. *Transport Policy*, 54, 53-60. doi:<https://doi.org/10.1016/j.tranpol.2016.12.005>
- Cherrett, T., Allen, J., McLeod, F., Maynard, S., Hickford, A., & Browne, M. (2012). Understanding urban freight activity – key issues for freight planning. *Journal of Transport Geography*, 24, 22-32. doi:10.1016/j.jtrangeo.2012.05.008
- CIVITAS Policy Note. (2015). Policy Note: Smart choices for cities. Making urban freight logistics more sustainable”. Retrieved from:

- <https://civitas.eu/content/civitas-policy-note-smart-choices-cities-making-urban-freight-logistics-more-sustainable>
- CIVITAS SMILE. (2009). Towards Sustainable Mobility for People in Urban Areas. Retrieved from: <https://civitas.eu/content/civitas-smile-project-description>
- CIVITAS. (2021). CIVITAS 2020: Cleaner and better transport in cities. Retrieved from: <https://civitas.eu/>
- Conway, A., Fatisson, P.-E., Eickemeyer, P., Cheng, J., & Peters, D. (2012). *Urban micro-consolidation and last mile goods delivery by freight-tricycle in Manhattan: Opportunities and challenges*. Paper presented at the Proceedings of the 91st Transportation Research Board Annual Meeting, Washington, DC, USA.
- Cooper, D. R. (2011). *Business research methods* (11. ed. ed.). New York: New York : McGraw-Hill Irwin.
- Coulombel, N., Dablanc, L., Gardrat, M., & Koning, M. (2018). The environmental social cost of urban road freight: Evidence from the Paris region. *Transportation Research Part D: Transport and Environment*, 63, 514-532.
doi:<https://doi.org/10.1016/j.trd.2018.06.002>
- Crainic, T. G., Errico, F., Rei, W., & Ricciardi, N. (2015). Modeling demand uncertainty in two-tier city logistics tactical planning. *Transportation Science*, 50(2), 559-578.
- Creswell, J. W. (2013). *Qualitative Inquiry and Research Design: Choosing Among Five Approaches*. (4 ed.) Thousands Oaks, CA: Sage.
- Cullinane, S. & Edwards, J. (2010) Assessing the environmental impacts of freight transport. A, Mckinnon., S, Cullinane., M, Browne., & A, Whiteing. (Eds.). *Green Logistics: Improving the environmental sustainability of logistics*. (s.31-48). London: Kogan Page Limited
- Czarniawska, B. (1998). *A narrative approach to organization studies* (Vol. 43): Sage Publications.
- Czarniawska, B. (2004). *Narratives in Social Science Research*. London: London: SAGE Publications.
- Dablanc, L. (2007). Goods transport in large European cities: Difficult to organize, difficult to modernize. *Transportation Research Part A: Policy and Practice*, 41(3), 280-285.
doi:<http://dx.doi.org/10.1016/j.tra.2006.05.005>
- Dablanc, L., Diziain, D., & Levifve, H. (2011). Urban freight consultations in the Paris region. *European transport research review*, 3(1), 47-57.

- Dablanc, L., Morganti, E., Arvidsson, N., Woxenius, J., Browne, M., & Saidi, N. (2017). The Rise of On-Demand 'Instant Deliveries' in European Cities. *Supply Chain Forum*, 18. doi:10.1080/16258312.2017.1375375
- Danielis, R., Rotaris, L., Marcucci, E. (2010) Urban freight policies and distribution channels: a discussion based on evidence from Italian cities, *European Transport \ Trasporti Europei*, 46, pp. 114-146.
- De Chennevière, P. D. R., Macharis, C., & Van Lier, T. (2017). *Smart governance in construction logistics: how to include participation in decision making?* Paper presented at the NECTAR XIV International Conference: Transport in a networked society.
- De Magalhães, D. J. A. (2010). Urban freight transport in a metropolitan context: The Belo Horizonte city case study. *Procedia-Social and Behavioral Sciences*, 2(3), 6076-6086.
- Den Boer, L., & Schrotten, A. (2007). Traffic noise reduction in Europe. *Ce Delft*, 14, 2057-2068.
- Denscombe, M. (2014). *The good research guide: for small-scale social research projects*: McGraw-Hill Education (UK).
- DG Move (2012). *European Commission: Study on Urban Freight Transport*. Final report by MDS Transmodal Limited in association with Centro di ricerca per il Trasporto e la Logistica (CTL). Retrieved from: <https://ec.europa.eu/transport/sites/default/files/themes/urban/studies/doc/2012-04-urban-freight-transport.pdf>
- Duranton, G., & Turner, M. A. (2011). The fundamental law of road congestion: Evidence from US cities. *The American economic review*, 101(6), 2616-2652.
- Easterby-Smith, M., Thorpe, R., & Lowe, A. (2002). *Management Research: An Introduction*: SAGE Publications.
- Eisenhardt, K. M., & Graebner, M. E. (2007). Theory building from cases: Opportunities and challenges. *Academy of management journal*, 50(1), 25.
- Elander, R., Lindgren, F., Wastesson, E., Langbroek, J., & Georén, D. (2017). *InterCityLog. Interoperabel samlogistiklösning med mindre fordon*, Sustainable innovation.
- Elkington, J. (1998). Accounting for the triple bottom line. *Measuring Business Excellence*, 2(3), 18-22. doi:10.1108/eb025539
- EU Sustainable Development Strategy. (2001). EU Sustainable Development Strategy. A Sustainable Europe for a Better World: A European Union Strategy for Sustainable Development. Brussels. 15.5.2001.COM. Retrieved from:

- https://ec.europa.eu/regional_policy/archive/innovation/pdf/library/strategy_sustdev_en.pdf
- Flyvbjerg, B. (2006). Five misunderstandings about case-study research. *Qualitative inquiry*, 12(2), 219-245.
- Fredriksson, A., Janné, M., Nolz, P., de Radiguès de Chennevière, P., van Lier, T., & Macharis, C. (2021). Creating stakeholder awareness in construction logistics by means of the MAMCA. *City and Environment Interactions*, 11, 100067. doi:<https://doi.org/10.1016/j.cacint.2021.100067>
- Freeman, R.E. (1984). *Strategic management: A stakeholder approach*. Boston: Pitman Publishing Inc.
- Galkin, A., Davidich, N., Filina-Dawidowicz, L., & Davidich, Y. (2019). Improving the Safety of Urban Freight Deliveries by Organization of the Transportation Process Considering Driver's State. *Transportation Research Procedia*, 39, 54-63. doi:<https://doi.org/10.1016/j.trpro.2019.06.007>
- Gatta, V., & Marcucci, E. (2014). Urban freight transport and policy changes: Improving decision makers' awareness via an agent-specific approach. *Transport Policy*, 36, 248-252. doi:<https://doi.org/10.1016/j.tranpol.2014.09.007>
- Giron, G., Goodchild, A., Ivanov, B., Kim, H., & Machado, J. (2018). *The Final 50 Feet of the Urban Goods Delivery System*. Supply Chain Transportation & Logistics Center, Seattle: University of Washington, 2018.
- Goodwin, P. (2004). The economic costs of road traffic congestion. UCL (University College London), The Rail Freight Group: London, UK. UPI: <https://discovery.ucl.ac.uk/id/eprint/1259>
- Håkansson, H., Ford, D., Gadde, L.-E., Snehota, I., & Waluszewski, A. (2009). *Business in networks*: John Wiley & Sons.
- Hedvall, K., Dubois, A., & Lind, F. (2017). Variety in freight transport service procurement approaches. *Transportation Research Procedia*, 25, 806-823. doi:<https://doi.org/10.1016/j.trpro.2017.05.459>
- Hensher, D. A., & Brewer, A. M. (2001). Developing a freight strategy: the use of a collaborative learning process to secure stakeholder input. *Transport Policy*, 8(1), 1-10.
- Hensher, D. A., & Puckett, S. (2004). Freight Distribution in Urban Areas: The role of supply chain alliances in addressing the challenge of traffic congestion for city logistics. Working Paper ITS-WP-04-15. Institute of Transport Studies, The University of Sydney and Monash University.

- Heutschi, K., Bühlmann, E., & Oertli, J. (2016). Options for reducing noise from roads and railway lines. *Transportation Research Part A: Policy and Practice*, 94, 308-322. doi:<https://doi.org/10.1016/j.tra.2016.09.019>
- Holguín-Veras, J., & Sánchez-Díaz, I. (2016). Freight Demand Management and the Potential of Receiver-Led Consolidation programs. *Transportation Research Part A: Policy and Practice*, 84, 109-130. doi: <https://doi.org/10.1016/j.tra.2015.06.013>
- Holguín-Veras, J., Amaya, J., Sánchez-Díaz, I., Browne, M., & Wojtowicz, J. (2020a). State of the art and practice of urban freight management Part II: Financial approaches, logistics, and demand management. *Transportation Research Part A Policy and Practice*, 137, 383-410. doi:10.1016/j.tra.2018.10.036
- Holguín-Veras, J., Amaya, J., Sánchez-Díaz, I., Browne, M., & Wojtowicz, J. (2020b). State of the art and practice of urban freight management: Part I: Infrastructure, vehicle-related, and traffic operations. *Transportation Research Part A Policy and Practice*, 137, 360-382. doi:10.1016/j.tra.2018.10.037
- Holguín-Veras, J., Amaya, J., Wojtowicz, J., Jaller, M., Gonzalez-Calderon, C., Sánchez-Díaz, I., . . . Browne, M. (2015). *NCFRP Report 33: Improving Freight System Performance in Metropolitan Areas: A Planning Guide*.
- Holguín-Veras, J., Aros-Vera, F., & Browne, M. (2015). Agent interactions and the response of supply chains to pricing and incentives. *Economics of Transportation*, 4(3), 147-155. doi:<http://dx.doi.org/10.1016/j.ecotra.2015.04.002>
- Holguín-Veras, J., Jaller, M., Destro, L., Ban, X., Lawson, C., & Levinson, H. S. (2011). Freight generation, freight trip generation, and perils of using constant trip rates. *Transportation Research Record*, 2224(1), 68-81.
- Holguín-Veras, J., Marquis, R., Campbell, S., Wojtowicz, J., Wang, C., Jaller, M., . . . Goevaers, R. (2014). Fostering the Use of Unassisted Off-Hour Deliveries: Operational and Low-Noise Truck Technologies. *Transportation Research Record Journal of the Transportation Research Board*, 2379, 57-63.
- Holguín-Veras, J., Ramirez-Rios, D., Encarnación, T., Gonzalez-Feliu, J., Caspersen, E., Rivera-Gonzalez, C., . . . Lima, R. (2019). Metropolitan Economies and the Generation of Freight and Service Activity: An International Perspective. In B. M., S. Behrends, J. Woxenius, G. Giuliano, & J. Holguin-Veras (Eds.), *Urban Logistics. Management, Policy and Innovation in a Rapidly Changing Environment*. London

- Holguín-Veras, J., Sánchez-Díaz, I., & Browne, M. (2016). Sustainable Urban Freight Systems and Freight Demand Management. *Transportation Research Procedia*, 12, 40-52. doi:<http://dx.doi.org/10.1016/j.trpro.2016.02.024>
- Holguín-Veras, J., Wang, C., Browne, M., Hodge, S. D., & Wojtowicz, J. (2014). The New York city off-hour delivery project: lessons for city logistics. *Procedia-Social and Behavioral Sciences*, 125, 36-48.
- Horizon 2020: European Commission. Work Programme 2016-2017. Retrieved from <https://ec.europa.eu/programmes/horizon2020/en/h2020-section/smart-green-and-integrated-transport>
- IEA (2020), *World Energy Outlook 2020*, IEA, Paris <https://www.iea.org/reports/world-energy-outlook-2020>.
- IEO (2019). *International Energy Outlook 2019*, U.S. Energy Information Administration, <https://www.eia.gov/outlooks/ieo/pdf/ieo2019.pdf>
- EPA (2020). U.S. Environmental protection Agency, Retrieved from: <https://www.epa.gov/environmental-topics/air-topics>
- IPCC (2014). Climate Change 2014: Synthesis Report. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change (2014). Retrieved from IPCC, Geneva, Switzerland: www.ipcc.ch
- ITF (2021), *ITF Transport Outlook 2021*, OECD Publishing, Paris, <https://doi.org/10.1787/16826a30-en>.
- ITF (2010). *ITF Transport Outlook 2010: The Potential for Innovation*. OECD Publishing, Paris, Retrieved from <https://www.itf-oecd.org/transport-outlook-2010>
- Kaplan, R., & Kaplan, S. (1989). *The experience of nature: A psychological perspective*: CUP Archive.
- Katsela, K., & Browne, M. (2019). Importance of the Stakeholders' Interaction: Comparative, Longitudinal Study of Two City Logistics Initiatives. *Sustainability (Switzerland)*, 2019, Vol. 11, Iss. 20, 11(20).
- Kin, B., Verlinde, S., van Lier, T., & Macharis, C. (2016). Is there Life After Subsidy for an Urban Consolidation Centre? An Investigation of the Total Costs and Benefits of a Privately-initiated Concept. *Transportation Research Procedia*, 12, 357-369. doi:<https://doi.org/10.1016/j.trpro.2016.02.072>
- Kucharska-Stasiak, E., & Olbińska, K. (2018). Reflecting Sustainability in Property Valuation - Defining the Problem. *Real Estate*

- Management and Valuation*, 26(2), 60. doi: <https://doi.org/10.2478/remav-2018-0016>
- Kvale, S. (2006). Dominance through interviews and dialogues. *Qualitative inquiry*, 12(3), 480-500.
- Le Pira, M., Gatta, V., Ignaccolo, M., Inturri, G., & Pluchino, A. (2017). Towards a decision-support procedure to foster stakeholder involvement and acceptability of urban freight transport policies. *European transport research review*, 9. doi:10.1007/s12544-017-0268-2
- Le Pira, M., Marcucci, E., & Gatta, V. (2017). Role-playing games as a mean to validate agent-based models: an application to stakeholder-driven urban freight transport policy-making. *Transportation Research Procedia*, 27, 404-411. doi:<https://doi.org/10.1016/j.trpro.2017.12.060>
- Leonardi, J., Browne, M., & Allen, J. (2012). Before-After Assessment of a Logistics Trial with Clean Urban Freight Vehicles: A Case Study in London. *Procedia - Social and Behavioral Sciences*, 39, 146-157. doi:<https://doi.org/10.1016/j.sbspro.2012.03.097>
- Lindholm, M. (2012). *Enabling sustainable development of urban freight from a local authority perspective*. Doktorsavhandlingar vid Chalmers tekniska högskola, Sweden, ISSN: 0346-718X.
- Lindholm, M. (2014). Successes and Failings of an Urban Freight Quality Partnership – The Story of the Gothenburg Local Freight Network. *Procedia - Social and Behavioral Sciences*, 125, 125-135. doi:<https://doi.org/10.1016/j.sbspro.2014.01.1461>
- Lindholm, M., & Blinge, M. (2014). Assessing knowledge and awareness of the sustainable urban freight transport among Swedish local authority policy planners. *Transport Policy*, 32, 124-131. doi:<https://doi.org/10.1016/j.tranpol.2014.01.004>
- Lindholm, M., & Behrends, S. (2012). Challenges in urban freight transport planning—a review in the Baltic Sea Region. *Journal of Transport Geography*, 22, 129-136.
- Lindholm, M., & Blinge, M. (2006). *The importance of systematic dissemination of obstacles and failures in pilot actions in sustainable freight distribution*. Paper presented at the Logistics Research Network Annual Conference, Newcastle.
- Lindholm, M., & Browne, M. (2013). Local authority cooperation with urban freight stakeholders: A comparison of partnership approaches. *European Journal of transport and infrastructure research*, 13(1).

- Lindholm, M., & Browne, M. (2014). Freight Quality Partnerships around the world. *Ist report on a survey, VREF Centre of excellence for Sustainable Urban Freight Systems.*
- Macharis, C., Milan, L., & Verlinde, S. (2014). A stakeholder-based multicriteria evaluation framework for city distribution. *Research in Transportation Business & Management, 11*, 75-84.
- Macharis, C., Turcksin, L., & Lebeau, K. (2012). Multi actor multi criteria analysis (MAMCA) as a tool to support sustainable decisions: State of use. *Decision Support Systems, 54*(1), 610-620. doi:<https://doi.org/10.1016/j.dss.2012.08.008>
- Maggi, E. (2007). La logistica urbana delle merci. *Aspetti economici e normativi.*
- Mancini, S., Gonzalez-Feliu, J., & Crainic, T. G. (2014). Planning and optimization methods for advanced urban logistics systems at tactical level. In *Sustainable Urban Logistics: Concepts, Methods and Information Systems* (pp. 145-164): Springer.
- Marcucci, E., & Danielis, R. (2007). The potential demand for a urban freight consolidation centre. *Springer Science+Business Media, 35*. doi:10.1007/s11116-007-9147-3
- Marcucci, E., & Gatta, V. (2014). Behavioral modeling of urban freight transport. In *Sustainable urban logistics: Concepts, methods and information systems* (pp. 227-243): Springer.
- McLeod, F., & Cherrett, T. (2011). Loading bay booking and control for urban freight. *International Journal of Logistics Research and Applications, 14*(6), 385-397.
- McLeod, F., Cherrett, T., Bailey, G., Allen, J., Browne, M., & Leonardi, J. (2015). Sustainable Procurement for Greener Logistics in the Higher Education Sector.. *Proceedings of the 20th Annual Logistics Research Network (LRN) Conference*, 1-8.
- Morganti, E., & Gonzalez-Feliu, J. (2015). City logistics for perishable products. The case of the Parma's Food Hub. *Case Studies on Transport Policy, 3*(2), 120-128.
- Muñuzuri, J., Cortés, P., Onieva, L., & Guadix, J. (2010). Modelling peak-hour urban freight movements with limited data availability. *Computers & Industrial Engineering, 59*(1), 34-44.
- Muñuzuri, J., Larrañeta, J., Onieva, L., & Cortés, P. (2005). Solutions applicable by local administrations for urban logistics improvement. *Cities, 22*(1), 15-28.
- Nguyen, T. B. T., Bektaş, T., Cherrett, T. J., McLeod, F. N., Allen, J., Bates, O., . . . Wise, S. (2018). Optimising parcel deliveries in London using dual-mode routing. *Journal of the Operational Research Society, 1-13*. doi:10.1080/01605682.2018.1480906

- Norman, W., & MacDonald, C. (2004). Getting to the bottom of "triple bottom line".(criticism of Triple Bottom Line paradigm)(Author Abstract). *Business ethics quarterly*, 14(2), 243.
- Nuzzolo, A., & Comi, A. (2014). Urban freight demand forecasting: a mixed quantity/delivery/vehicle-based model. *Transportation Research Part E: Logistics and Transportation Review*, 65, 84-98.
- OECD. (2003). *Delivering the goods – 21st century challenges to urban goods transport*, OECD, Paris.
- OECD/European Commission. (2020). *Cities in the World: A New Perspective on Urbanisation*. Paris: OECD Publishing, doi: <https://doi.org/10.1787/d0efcbda-en>.
- Ogden, K. W. (1992). *Urban goods movement: a guide to policy and planning*. Aldershot: Ashgate Publishing Company.
- Ögren, M., Molnár, P., & Barregard, L. (2018). Road traffic noise abatement scenarios in Gothenburg 2015 – 2035. *Environmental Research*, 164, 516-521. doi:<https://doi.org/10.1016/j.envres.2018.03.011>
- Ohiduzzaman, M., Sirin, O., Kassem, E., & Rochat, J. L. (2016). State-of-the-Art Review on Sustainable Design and Construction of Quieter Pavements—*Part 1: Traffic Noise Measurement and Abatement Techniques*. 8(8), 742.
- Österle, I., Aditjandra, P. T., Vaghi, C., Grea, G., & Zunder, T. H. (2015). The role of a structured stakeholder consultation process within the establishment of a sustainable urban supply chain. *Supply Chain Management: An International Journal*, 20(3), 284-299. doi:doi:10.1108/SCM-05-2014-0149
- Osterwalder, A., & Pigneur, Y. (2010). *Business model generation: a handbook for visionaries, game changers, and challengers*: Hoboken, N.J. Wiley.
- Parmar, B., Freeman, R., Harrison, J., Purnell, A., & De Colle, S. (2010). Stakeholder Theory: The State of the Art. *The Academy of Management Annals*, 3, 403-445. doi:10.1080/19416520.2010.495581
- Quak, H. (2008). *Sustainability of urban freight transport: Retail distribution and local regulations in cities*. Ph.D. thesis, Erasmus Research Institute of Management, Rotterdam, The Netherlands.
- Quak, H., & Tavasszy, L. (2011). Customized Solutions for Sustainable City Logistics: The Viability of Urban Freight Consolidation Centres. In J. A. E. E. van Nunen, P. Huijbregts, & P. Rietveld (Eds.), *Transitions Towards Sustainable Mobility: New Solutions*

- and Approaches for Sustainable Transport Systems* (pp. 213-233). Berlin, Heidelberg: Springer Berlin Heidelberg.
- Quak, H., Balm, S., & Posthumus, B. (2014). Evaluation of City Logistics Solutions with Business Model Analysis. *Procedia - Social and Behavioral Sciences*, 125, 111-124. doi:<https://doi.org/10.1016/j.sbspro.2014.01.1460>
- Quak, H., Lindholm, M., Tavasszy, L., & Browne, M. (2016). From Freight Partnerships to City Logistics Living Labs – Giving Meaning to the Elusive Concept of Living Labs. *Transportation Research Procedia*, 12, 461-473. doi:<https://doi.org/10.1016/j.trpro.2016.02.080>
- Quak, H., van Duin, R., & Hendriks, B. (2020). Running an urban consolidation centre: Binnenstadservice 10 years back and forth. *Transportation Research Procedia*, 46, urn:issn: 2352-1465.
- Qureshi, A., Taniguchi, E., & Yamada, T. (2009). An exact solution approach for vehicle routing and scheduling problems with soft time windows. *Transportation Research Part E: Logistics and Transportation Review*, 45(6), 960-977.
- Rogers, R. (1999) Urban Task Force: Towards an urban renaissance: final report of the urban task force chaired by Lord Rogers of Riverside. *Department of the Environment, Transport and the Regions, London*.
- Rogerson, S. (2017). Influence of freight transport purchasing processes on logistical variables related to CO2 emissions: a case study in Sweden. *International Journal of Logistics Research and Applications*, 20(6), 604-623. doi:[10.1080/13675567.2017.1308472](https://doi.org/10.1080/13675567.2017.1308472)
- Russo, F., & Comi, A. (2011). A model system for the ex-ante assessment of city logistics measures. *Research in transportation economics*, 31(1), 81-87.
- Russo, F., Rindone, C., & Panuccio, P. (2016). European plans for the smart city: from theories and rules to logistics test case. *European Planning Studies*, 24(9), 1709-1726. doi:[10.1080/09654313.2016.1182120](https://doi.org/10.1080/09654313.2016.1182120)
- Sánchez-Díaz, I. (2017). Modeling urban freight generation: A study of commercial establishments' freight needs. *Transportation Research Part A: Policy and Practice*, 102, 3-17. doi:<https://doi.org/10.1016/j.tra.2016.06.035>
- Sánchez-Díaz, I., Georén, P., & Brolinson, M. (2016). Shifting urban freight deliveries to the off-peak hours: a review of theory and practice. *Transport Reviews*, 1-23.

- Sánchez-Díaz, I., Holguin-Veras, J., & Wang, X. (2016). An exploratory analysis of spatial effects on freight trip attraction. *Transportation*, 43(1), 177-196. doi:10.1007/s11116-014-9570-1
- Sandberg, U., & Ejsmont, J. (2002). *Tyre/road noise*. Reference book.
- Santén, V. (2017). Towards more efficient logistics: increasing load factor in a shipper's road transport. *The International Journal of Logistics Management*, 28(2), 228-250. doi:10.1108/IJLM-04-2015-0071
- Siggelkow, N. (2007). Persuasion with case studies. *Academy of management journal*, 50(1), 20.
- Silverman, D. (2001). *Interpreting qualitative data: Methods for Analysing Talk, Text and Interaction*, London, UK: Sage Publications, Inc.
- Silverman, D. (2007). *A very short, fairly interesting and reasonably cheap book about qualitative research*: Taylor & Francis.
- Snehota, I., & Hakansson, H. (1995). *Developing relationships in business networks*: Routledge London.
- Stansfeld, S. (2015). Noise effects on health in the context of air pollution exposure. *International journal of environmental research public health*, 12 (10), 12735-12760.
- Stathopoulos, A., Valeri, E., & Marcucci, E. (2012). Stakeholder reactions to urban freight policy innovation. *Journal of Transport Geography*, 22, 34-45. doi:https://doi.org/10.1016/j.jtrangeo.2011.11.017
- SUGAR. (2011). Sustainable urban goods logistics achieved by regional and local policies. Retrieved from <http://www.sugarlogistics.eu/>
- Sverdrup, H., & Svensson, M. G. (2004). Defining the concept of sustainability-a matter of systems thinking and applied systems analysis. In *Systems approaches and their application* (pp. 143-164): Springer.
- Sweet, M. (2011). Does Traffic Congestion Slow the Economy? *Journal of Planning Literature*, 26(4), 391-404. doi:10.1177/0885412211409754
- Taniguchi, E., & Shimamoto, H. (2004). Intelligent transportation system based dynamic vehicle routing and scheduling with variable travel times. *Transportation Research Part C: Emerging Technologies*, 12(3-4), 235-250.
- Taniguchi, E., & Thompson, R. G. (2014). *City logistics: Mapping the future*: CRC Press.
- Taniguchi, E., Thompson, R. G., Yamada, T., and van Duin, R. (2001). *City logistics: Network modelling and intelligent transport systems*, Pergamon, Oxford.

- Teece, D. J. (2010). Business Models, Business Strategy and Innovation. *Long range planning*, 43(2), 172-194. doi:10.1016/j.lrp.2009.07.003
- Teo, J. S. E., Taniguchi, E., & Qureshi, A. G. (2014). Multi-agent systems modelling approach to evaluate urban motorways for city logistics. *International Journal of Urban Sciences*, 18(2), 154-165. doi:10.1080/12265934.2014.929020
- Thompson, C. W. (1998). Historic American parks and contemporary needs. *Landscape Journal*, 17(1), 1-25.
- Thompson, C. W. (2002). Urban open space in the 21st century. *Landscape and Urban Planning*, 60(2), 59-72.
- Toilier, F., Gardrat, M., Routhier, J. L., & Bonnafous, A. (2018). Freight transport modelling in urban areas: The French case of the FRETURB model. *Case Studies on Transport Policy*, 6(4), 753-764. doi: <https://doi.org/10.1016/j.cstp.2018.09.009>
- van Rooijen, T., & Quak, H. (2010). Local impacts of a new urban consolidation centre – the case of Binnenstadservice.nl. *Procedia - Social and Behavioral Sciences*, 2(3), 5967-5979. doi:<https://doi.org/10.1016/j.sbspro.2010.04.011>
- Verlinde, S., Kin, B., Strale, M., & Macharis, C. (2016). Sustainable freight deliveries in the pedestrian zone: facilitating the necessity. *Portfolio*, 1, 97-109.
- Verlinde, S., Macharis, C., & Witlox, F. (2012). How to Consolidate Urban Flows of Goods Without Setting up an Urban Consolidation Centre? *Procedia - Social and Behavioral Sciences*, 39, 687-701. doi:<https://doi.org/10.1016/j.sbspro.2012.03.140>
- Verlinde, S., Macharis, C., Milan, L., & Kin, B. (2014). Does a mobile depot make urban deliveries faster, more sustainable and more economically viable: results of a pilot test in Brussels. *Transportation Research Procedia*, 4, 361-373.
- Vision Zero. (2021). Vision Zero – no fatalities or serious injuries through road accidents. Road Safety Sweden. Retrieved from: <https://www.roadsafetysweden.com/about-the-conference/vision-zero---no-fatalities-or-serious-injuries-through-road-accidents/> on 15/10/2021.
- Voss, C., Tsirikrisis, N., & Frohlich, M. (2002). Case research in operations management. *International Journal of Operations & Production Management*, 22(2), 195-219. doi:10.1108/01443570210414329
- Warren-Myers, G. (2012). The value of sustainability in real estate: a review from a valuation perspective. *Journal of Property*

- Investment & Finance*, 30(2), 115-144.
doi:10.1108/14635781211206887
- Webster, J., & Watson, R. T. (2002). Analyzing the past to prepare for the future writing a literature review. *MIS Quarterly*, 26 (2), 13-23.
- White Paper. (2011). Roadmap to a Single European Transport Area: Towards a Competitive and Resource Efficient Transport System. Retrieved from: <https://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2011:0144:FIN:EN:PDF>
- WHO. (2019). Transport: Air pollution. (2019). Retrieved from https://www.who.int/health-topics/air-pollution#tab=tab_1
- Woxenius, J. (2012). Directness as a key performance indicator for freight transport chains. *Research in transportation economics*, 36(1), 63-72.
- Yang, Z. Z., & Moodie, D. R. (2011). Locating urban logistics terminals and shopping centres in a Chinese city. *International Journal of Logistics Research and Applications*, 14(3), 165-177.
- Yin, R. (1994). *Case study research: Design and methods*. Beverly Hills. In: CA: Sage publishing.
- Yin, R. (2018). *Case study research and applications: design and methods* (Sixth edition ed.): Thousand Oaks, California: SAGE.
- Zott, C., Amit, R., & Massa, L. (2011). The Business Model: Recent Developments and Future Research. *Journal of Management*, 37(4), 1019-1042. doi:10.1177/0149206311406265
- Zou, W., Wang, X., Conway, A., & Chen, Q. (2016). Empirical Analysis of Delivery Vehicle On-Street Parking Pattern in Manhattan Area. *Journal of Urban Planning and Development*, 142(2), 04015017. doi:10.1061/(ASCE)UP.1943-5444.0000300
- Zunder, T. H., Aditjandra, P. T., & Carnaby, B. (2014). Developing a local research strategy for city logistics on an academic campus. *International Journal of Urban Sciences*, 18(2), 262-277.