IMPLEMENTING URBAN FREIGHT POLICY MEASURES: USING LOCAL TRANSPORT POLICIES TO SUPPORT URBAN CONSOLIDATION CENTRES

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Declaration

I hereby declare that the work presented in this thesis has not been submitted for any other degree or professional qualification, and that it is the result of my own independent work.

Emine Zehra Yurtkulu Akgün

8 February 2021

This acknowledgement is going to be a long one, so fasten your seatbelts. I am grateful to have so many people supporting me. I would not be the person I am today if you were not there for me.

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ABSTRACT

This thesis presents an analysis of policymaking by local authorities in the context of urban freight transport (UFT). The aim of this study is to understand the impact of policy actions taken at the local level on the viability of urban consolidation centres (UCCs). UFT is a neglected topic in the case of local authorities; they often give very limited or no space to freight in their local transport plans. The main problem is that local authorities do not see policymaking as a systematic process when it comes to regulating UFT. Cashore and Howlett (2009) emphasise the necessity for disaggregating different elements (e.g., high-level goals, objectives, on-the-ground requirements, norms, and specific instruments) of policy in order to construct accurate models of policy dynamics. Local authorities are lacking this process of disaggregation. The thesis topic is analysed in three distinct sections. Each section adopts a case study methodology. A case study methodology suits the overall aim of the thesis as it enables an in-depth examination of UFT policies in the context of local authorities. The sequence of the case studies is designed to first to provide a broader perspective on policymaking and policy choice of local authorities. Later, the discussion focuses on a particular UFT policy via identifying local transport policies as a means of support to develop and to encourage the use of UCCs.

The first study investigates UFT policy choice by local authorities, investigating how policy context, resource availability and the need for legitimacy influence how local authorities seek and select UFT specific policies. The methodology is a cross-case analysis of eleven cities across three countries (Sweden, England and Scotland), based on interview and documentary data. The second study investigates how local transport policies work in conjunction with stakeholder collaboration as a means of supporting mechanisms to enable the development of public led UCCs. The methodology is a multiple case study approach, comparing cases in Sweden and Scotland, two countries that, as discovered in the first part of the research, are more/less advanced in their approach to UFT policy. The third study focuses on UCC users, and the aim is to investigate the willingness of retailers to subscribe to UCCs when local transport policies (both existing and potential policies) are introduced. The methodology is a single case study approach based in the city centre of Edinburgh.

The first study reveals in most cases, the rather general high-level policy goals are not broken down into clear objectives with targets that can be measured. Therefore, selected UFT policy measures are chosen from a pool of common measures (primarily access restrictions such as time windows and weight restrictions), but without monitored targets that determine whether or not they are achieving objectives. There is a lack of a strategic approach to setting and reviewing measures according to achieving specific policy goals. This is primarily a result of a lack of resources and dedicated UFT personnel, as well as challenges related to public acceptability of restrictive policies. The second study identified that policies such as time window restrictions could support successful UCCs, but they cannot be considered in isolation from the collaborative UFT policy setting established by local authorities, confirming the results from part one. The findings of the third study showed that the current local transport policies are not enough to change the retailers' opinions on UCCs, as opposed to the findings of the successful Swedish UCC studied in the second part of the thesis. Even if local authorities were to start imposing more restrictive transport policies, it would not influence many retailers' decisions on receiving their deliveries through UCCs. Operational factors such as not being able to receive their deliveries on time and political factors such as the degree of communication between the stakeholders would be the driving factors for retailers to consider using UCCs.

The overall findings of this thesis show that local authorities are able to identify high-level goals, which are not broken down into clear objectives with targets that can be measured. UCCs are one of the policy measures that have been initiated by local authorities for many years, and yet the success rate of these initiatives remains low. The main reasons behind the unsuccessful implementation of UCCs and other UFT policy measures are various. Local authorities do not specify the formal aim of policies, and they do not invest in identifying specific on-the-ground requirements that particular places and stakeholders need. Many local authorities in Europe lack the resources that could enable them to improve their collaboration with commercial stakeholders such as retailers and logistics service providers and design effective UFT policy measures that can obtain public acceptance from the users and therefore stand a better chance of commercial viability. In accordance with Edinburgh Napier University regulations, a list of publications must be stated resulting from the research undertaken. The following publications have been published:

Chapter 4: Urban freight transport in local authorities

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LIST OF ABBREVIATIONS

| AQAP | Air Quality Action Plan |
|----------|---|
| AQMA | Air Quality Management Area |
| CLOCS | Construction Logistics and Community Safety |
| DEFRA | Department for Environment, Food & Rural Affairs |
| DfT | Department for Transport |
| DSP | Delivery and Service Planning |
| EU | European Union |
| FORS | Fleet Operator Recognition Scheme |
| FQP | Freight Quality Partnership |
| HGV | Heavy Goods Vehicle |
| KPI | Key Performance Indicators |
| LEZ | Low Emission Zone |
| LGV | Light Goods Vehicle |
| LSP | Logistics Service Provider |
| LTP | Local Transport Plan |
| LTS | Local Transport strategy |
| LUB | Loading and Unloading Bay |
| NECA | North East Combined Authority |
| NESTRANS | North East of Scotland Transport Partnership |
| NTS | National Transport Strategy |
| OHD | Out-of-hours Delivery |
| RTP | Regional Transport Partnership |
| RTS | Regional Transport Strategy |
| ScotFLAG | The Scottish Freight and Logistics Advisory Group |
| SEStran | South East of Scotland Transport Partnership |
| SPT | Strathclyde Partnership for Transport |
| SULP | Sustainable Urban Logistics Plan |
| SUMP | Sustainable Urban Mobility Plan |

| TACTRAN | Tayside and Central Scotland Transport Partnership |
|---------|--|
| TfGM | Transport for Greater Manchester |
| TRO | Traffic Regulation Order |
| UCC | Urban Consolidation Centre |
| UFT | Urban Freight Transport |
| WMCA | West Midlands Combined Authority |

1.1 Background

Urban freight transport (UFT) brings both benefits and challenges to cities; thus, local authorities need to balance their priorities between supporting the economy and providing adequate living standards. As cities accommodate an increasing number of people, the dependency on efficient transport networks increases in parallel (Dablanc, 2007). The public is not the only stakeholder in cities that will be affected by the state of freight transport. If local authorities aim to attract businesses to locate and remain in their cities in the long term, local authorities need to recognise businesses' needs related to logistics as UFT is essential to their economic prosperity (Anderson et al., 2005; Ballantyne et al., 2013; Kiba-Janiak, 2017). Despite the increasing awareness of freight transport, most local authorities in Europe do not hold the necessary competence and knowledge to manage UFT (Lindholm and Blinge, 2014; Fossheim and Andersen, 2017; Kiba-Janiak, 2017). Local authorities should aim to design inclusive strategies that involve all elements of traffic, including UFT, but historically local authorities have paid more attention to passenger transport (Ogden, 1984; Marsden et al., 2011; Cherrett et al., 2012; Ballantyne et al., 2013; Lindholm and Blinge, 2014).

The approach to this thesis is based on the framework of Howlett and Cashore (2009), which argued that policies are not just measures implemented "on the ground" but form a chain from high-level goals down to practical measures. Each element of a policy should be considered in detail in order to implement accurate policy actions. Goals refer to general ideas and aims, which policymakers intend to address by then producing specific objectives ideally with targets, and then selecting policy measures. These are the mechanisms actually applied, which can be in different forms such as enforcements (e.g., time window restrictions) or voluntary initiatives (e.g. urban consolidation centres, certification schemes). Previous research (Marsden et al., 2014; Monios, 2016) has suggested that the link between strategic goals (more abstract, higher level elements) and adopted measures (least abstract, practical mechanisms) is

frequently not strong enough when policymakers construct policy goals and select measures. Marsden and Reardon (2017) showed that almost the entirety of academic papers on transport policy focus on the implemented measures rather than the link between measures and goals. Three studies have been formulated to fulfil the objectives of this thesis, which is to analyse the disaggregation process in choosing and making policies for UFT at the level of local authorities.

The first part of the thesis investigates the process of how local authorities identify and select UFT specific policies to achieve their transport goals and how this process is influenced by the UFT policy environment. The implementation processes of urban consolidation centres (UCCs) present a particular example, which misses links between goals and adopted measures. UCCs are often initiated by public authorities and the vast majority of the projects failed either after public subsidies ended or have been discontinued after feasibility studies (Quak and Tavasszy 2011; Allen et al. 2012; Kin et al. 2017; Johansson and Björklund 2017; Paddeu 2017). Therefore, the second part presents an analysis of supporting policy measures for developing financially viable UCCs and the interrelation between the supportive policies and the UCC development process. UCCs are logistics facilities offering freight consolidation, delivery and other value-adding services. Public organisations (e.g., local authorities) or private companies (e.g., logistics service providers) can initiate UCCs. This thesis will specifically focus on the investigation of public-led UCCs. This type of UCCs provide services for both perishable and non-perishable goods. This study focuses on the UCCs which offers freight consolidation for nonperishable goods to its receivers (e.g., retailers) by consolidating their multiple deliveries from multiple suppliers (e.g., manufacturers, logistics service providers). UCCs provide other services in addition to delivery and consolidation. The additional services include waste management, e-commerce support, pre-retailing, space for additional stockholding, customised delivery date & time, tracking & tracing, and delivery with low emission vehicles. Public organisations provide the finance for this type of UCCs from the beginning of UCC projects until a specific period of time.

The growing body of literature studying UCCs reveals that the challenges and the benefits are fairly established (van Duin et al., 2010; Allen et al., 2012; Allen et al., 2014). On the other hand, the components of business models have been described

rarely (Björklund et al., 2017). The allocation of costs and benefits to stakeholders and policy planning are some of the critical issues to be addressed in the design of business models (Browne et al., 2005; Marcucci and Danielis, 2008; Björklund et al., 2017; Lebeau et al., 2017). There is only limited knowledge on the supporting mechanisms which are not only based on financial support but also more sophisticated policy planning. Only a small amount of work has begun to consider how local authorities can implement accompanying policy measures in order to encourage the use of UCCs, some of which was published at the same time as this thesis was being written (Panero, et al., 2011; Ville et al., 2013; Holguín-Veras et al., 2016b; Lebeau et al., 2017; Marcucci and Gatta, 2017).

The second section aims to fill this gap by focusing on UFT policy measures such as UCCs and local authorities, and the importance of the public-private collaborative context of UFT through the use of other UFT policy measures. Several authors have found that the significant problem with UCC projects is that their inability to attract sufficient users limits their financial viability; many have failed either after public subsidies ended or have been discontinued after feasibility studies (Quak and Tavasszy, 2011; Allen et al., 2012; Kin et al., 2017; Johansson and Björklund, 2017; Paddeu, 2017). The third study focuses on the retailers' perceptions of using UCCs under the implementation of supporting UFT policies. The research focusing on retailers and UCCs is limited; particularly the research focusing on the conceptualisation of retail stores as a subsystem in the supply chain and focusing on in-store logistics processes and operations (Gammelgaard, 2015; Gammelgaard et al., 2017). The research on existing UCCs shows that the business models cannot always facilitate an efficient delivery system through UCCs and offer services that retailers need. Knowing more about retailers' problems caused by UFT policies and their needs for logistics operations can enable local authorities to implement more targeted policies that will result in sufficient users to make UCCs financially viable.



Figure 1.1: The components of the thesis topic

The main contribution of this thesis is to investigate the process of policymaking in local authorities in the context of UFT by specifically focusing on the impact of policy actions taken at the local level on the viability of UCCs. The topic is inspired from the framework of Howlett and Cashore (2009). It is divided into three distinct sections (as shown in Figure 1.1) focusing on (1) the influences on the UFT policy choice, (2) the use of UFT policies to support the development of viable UCC projects, and (3) retailers' perceptions on the implementation of supportive UFT policies and retailers' willingness to use UCCs. This thesis aims to extend the knowledge by applying the framework of Howlett and Cashore (2009) in the context of UFT rather than developing a new theory. The qualitative case studies in this thesis present a multidimensional view of the process of policymaking that begins with a broader analysis of 11 cities in part one, and then the studies focus on a specific UFT policy measure in the context of UCCs in Gothenburg and Perth in part two and Edinburgh in part three.

1.2 Research aim and research questions

Local authorities do not always see policymaking as a systematic process when it comes to regulating UFT and hold very limited resources to disaggregate different elements of policymaking to construct accurate policy measures. While the existing research elaborates local authorities and how they regulate UFT, the process of disaggregating policies and the evaluation of policymaking processes in this regard remain a gap that needs to be filled. The following research questions were formulated to address the aim of this study, which is to understand the impact of policy actions taken at the local level on the viability of UCCs:

- 1. How do local authorities seek and select local transport policy measures to regulate urban freight transport (UFT)?
- 2. How do supportive UFT policy measures work in conjunction with stakeholder collaboration to support successful public led urban consolidation centres (UCC) developments?
- 3. How do supportive UFT policy measures affect the willingness and the perceptions of retailers in using UCCs for their last-mile deliveries?

1.3 Methodology and research design

This thesis is qualitative in nature and it adopts a case study methodology. The case study design is an appropriate choice when researchers want to cover complex multivariate conditions. The qualitative case study design is one of the most suitable approaches for elaborating an existing theory or building new theory (Fawcett et al. 2014). These two aims are suited to this thesis. Figure 1.2 summarises the details of the studies designed in each part of the thesis.

The first part is exploratory in nature. In this part, local authority planners were asked about how they select UFT policy measures, and how this process is influenced by the features of the UFT policy environment. The methodology applied is a cross-case analysis of eleven cities from Scotland, England and Sweden. The case selection for this study was based on the concept of policy maturity introduced by Kiba-Janiak (2017). The interviews were organised with transport planners and heads of transport strategy in each of the case study cities. In total, 15 interviews have been completed. The interview guide is presented in Appendix B.

The second part adopted a multiple case study design, in which two UCC projects were compared. The sample selection was based on finding a more active and a less active country in terms of managing and regulating UFT; thus one case is from

Sweden (Gothenburg) and the other is from Scotland (Perth). The interviews were performed with the same types of respondents in both cases studies: initiators, users, government and industry representatives and independent experts. The interview questions (presented in Appendix C) focused on four main themes: the challenges of the development processes, supporting policies, stakeholder collaboration, and service offerings by UCCs. A total of 23 interviews were conducted, face-to-face and by telephone. The purpose was to attempt to identify key differences between the two case studies which would then identify the critical elements in the successful operation of a UCC.

The third part of the thesis adopted a single case study design. The unit of analysis is the city of Edinburgh. The case study aims to analyse the retailers' perceptions of supporting policies and willingness to use UCCs under the implementation of supporting policies. The interviews have been done with 30 independent retailers located in vibrant and populated neighbourhoods of the city. Appendix D presents the interview guide, which consists of the interview questions. The choice of the case has been driven by the findings of the second case study. Also, the city of Edinburgh is growing rapidly, and the speed of the growth triggers the need for freight even more. The interview guide consists of the questions that focus on logistics operations of the retailers, difficulties experienced due to existing local transport policies, the impact of supportive UFT policies on the willingness of retailers to use a UCC and the impact of value-added services on the willingness of retailers to use a UCC.

Characteristics of part I Multiple-case study 11 local authorities Scotland (Glasgow, Edinburgh, Dundee, Aberdeen) England (Greater Machester, Birmingham, Bristol, Newcastle-Upon-Tyne) Sweden (Stokcholm, Gothenburg, Malmö)

> Characteristics of part II Multiple-case study Two urban consolidation centres Stadsleveransen (Gothenburg, Sweden) Perth UCC (Perth, UK)

> > Characteristics of part III Single case study A single city to investigate independant retailers Edinburgh UK

Figure 1.2: The type of case studies used in each part of the thesis

The challenges related to adopting the case study methodology will be discussed further in the methodology chapter; however, the generalisability of findings from case studies is one of the most significant issues. Generalisability and validity can benefit from increasing the number of case studies; however, the increasing number of cases could bring up the discussion about quantity versus quality. The approaches to data collection and data analysis ensure rigour and relevance of this study. For data collection, the main themes have been defined based on the existing literature. This approach helped to classify and code the vast amount of qualitative data for analysis. As the main themes help guide the discussion, it also increases the objectivity of the discussion and helps avoid bias that may affect the research outcome.

1.4 Structure of the thesis

This thesis is divided into eight chapters. Chapter 1 explains the contextual background of this thesis. It presents the research aim and key research questions which address the issues to be investigated. This chapter also briefly presents the methodology and summarises the impact and relevance of the findings.

Chapter 2 presents an extensive discussion of the previous research that paves the way for investigating the central phenomena. The studies are discussed in four categories: general issues related to UFT such as challenges, benefits, stakeholders and policies; the policy process in UFT; the specific topic of UCCs; and the specific context of retailers. Each section has various sub-sections to present the niche areas on which this thesis aims to focus.

Chapter 3 describes the research methodology adopted in this thesis. It explains the fit of the research methodology considering the overall aim of the thesis and the research questions. The data collection and the data analysis techniques will be analysed in detail. The credibility and the limitation of the adopted methodology are discussed in this chapter.

Chapter 4, 5 & 6 presents the findings from the three studies that comprise the main body of this research. Chapter 4 presents 11 case studies of UFT processes in local authorities across three countries: Scotland, England and Sweden. Chapter 5 presents two in-depth case studies of UCCs in Scotland and Sweden. Chapter 6 continues to narrow down the focus to one case study in Scotland. The interviews in these case studies are carried out with local authorities, regional transport partnerships, national transport authorities, freight quality partnerships (FQP), logistics service providers (LSP), logistics associations, an association of real estate owners, freight associations and retailers.

Chapter 7 discusses and critiques the findings of this research. The data collected from all 68 interviews across the three stages of the research will be combined for further theoretical analysis. The previous studies will be brought in to compare and contrast the findings of this study.

Chapter 8 consists of conclusions and discusses how each of the three parts of the thesis answer the three research questions. The relevance and the importance of the findings of the thesis are discussed in this chapter, as well as the contribution of this thesis to existing knowledge, both theoretical and practical. Finally, this chapter discusses the overall limitations of this thesis. This part also discusses the venues for further research. It is followed by references and appendices.

2.1 Introduction

UFT is a topic that recently attract the attention of public authorities. There are still many gaps remaining in the knowledge about how public authorities perceive benefits and problems of UFT for cities, how they build knowledge on the issue for implementing appropriate policy measures to mitigate problems and, the issues that public authorities need to consider or the implementation of effective policies for various stakeholders of UFT. UCCs are one of the most popular initiatives that public authorities support for their establishments through providing financial subsidies and implementing local transport policies aimed at directly or indirectly enforcing the use of UCCs.

Even though UCCs attract substantial attention from public authorities, it is one of the policy measures that fail significantly. The second part of this literature review will present an in-depth review of UCCs comprising stakeholder collaboration, service offerings, challenges of business models of UCCs and finally the use of local transport policies and financial subsidies as the means of support. The third section of the review analyses the studies in order to make a critical analysis of existing studies about retailers' perceptions on using UCC. The analysis focuses on identifying the gaps on the local policy measures applied to incentivise retailers to use UCC in relation to social, financial and operational impacts of policy measures on retailers, willingness of retailers to accept operating under particular policy measures and the services offered at UCCs.

2.2 General overview of the phenomenon: Urban Freight Transport

UFT is concerned with the delivery and collections of goods in the urban areas such as cities, towns and suburbs (Browne et al., 2005; Crainic et al., 2004). Goods flow comprises retail deliveries, waste disposal and returned products. Urban areas are the centres of various economic and social activities, such as living, working, leisure, production, travelling, and healthcare as well shopping. Urban areas are characterised by intense amount of commercial buildings, houses, high variety of streets, roads, bridges and railways. Approximately 80% of the populations live in the urban areas and this population is expected to increase in the future. (Cherrett et al., 2012). Increasing population and economic growth are expected to trigger an increase in demand and supply of goods and services in cities, therefore flow of goods to and from the cities will increase in parallel. Road transportation is the most common distribution mode used in the urban areas and it takes the biggest share among other inland freight transport modes in EU. Latest available data show that the road transport accounted for 75.3% of the total inland freight transport -based on tonne-kilometres performed in EU (Eurostat, 2020).

In 2018, 193 billion tonne kilometres of domestic freight was moved within the UK and 79% of the domestic freight was moved by road (Department for Transport, 2019). This particular information can be adjusted in the case of UFT – not in terms of numbers but in terms of extensive usage of road transportation in the urban context. In 2013, 303.7 billion miles were travelled by different types of road vehicles (cars, busses, trucks, vans) in the UK. 37% of the total miles were travelled in urban areas and 19.1 % of the total miles were travelled by goods vehicles (Department for Transport, 2014). UFT concerns with the movement of things (excluding people) from, to and through the urban areas (Browne et al., 2005). Consolidation and shortterm storage also became a part of the freight transportation in the urban areas. UFT is a system, where several actors interact, and they do not always aim for the same goals and objectives. These actors are divided in two main groups: public actors (including local authorities, national authorities, residents, planning agencies, as well as visitors) and private actors (including shippers, receivers, and transport operators).

Private actors are generally driven by economic motivations such as cost efficiency, on-time delivery and on-shelf availability (Wygonik et al., 2015). On the other hand, public actors are concentrated on increasing the social welfare of urban areas. Various objectives, constraints and perspectives turn UFT into a very complex system. Dealing with this complexity is important for both private and public actors as transportation create wealth on both public and private settings. In order to ensure the system's operability and efficiency, they should go beyond acting as an independent entity actor and they should acknowledge each other's operational requirements and constraints (Ballantyne et al., 2013). Collaboration through not only public funding but also consultation, extended dialogue and innovation is the key for collaborative transportation planning and its continuity in the long term (Crainic et al., 2004). However, the development of such collaboration is still in its infancy era and there is no widely recognised scheme for collaborative planning of the transport activities in urban areas (Lindholm and Browne, 2013).

2.3 Problems, perspectives and mitigation strategies for urban freight transport

Freight transport in urban areas becomes crucial as it sustains the existing lifestyle of cities. UFT achieves this mission by enabling trade activities that produce the wealth in cities/countries and effecting cost of the good sold in a region by influencing cost of freight transport (Anderson et al., 2005; Cui et al., 2015). Despite of the economic contributions to a region, road freight transportation is a major contributor to air pollution (CO₂, NOx, PM₁₀), noise nuisance, the use of non-renewable fossil–fuel, the physical consequences of pollutant emissions on public health, traffic congestion, and the injuries and death resulting from traffic accidents (Dablanc et al., 2011). There is no doubt about the fact that goods' vehicles are not alone in the traffic, and they are not the only source of negative consequences. According to Lindholm and Blinge (2014), vehicles used for goods' distribution in urban areas cause approximately 40% of the total air pollution.

Shorter journeys, high stop frequency and high congestion levels cause higher level of fuel consumption, and many negative impacts of freight transportation are associated with fuel consumption (Verlinde, 2015). Therefore, these negative impacts become more obvious in the eye of habitants and local authorities of the cities when it comes to UFT. Decisions related to freight transportation are mostly made according to efficiency measures defined by freight carriers as trucking industry is a highly competitive one and transport operators are under pressure of some requirements that are put forward by their supply chain partners. Therefore, freight carriers will seek for reducing their costs due to the extreme competition while offering flexibility for their supply chain partners, and meeting service criteria by optimising order delivery times and delivery time windows (van Laarhoven et al., 2000; Dablanc, 2007; Österle et al., 2015). Private actors have a significant role in contributing to the development of trucking industry and increasing operational performance of their supply chain partners such as ensuring adequate supply at the stores (Österle et al., 2015).

Technology, global competition and consumption cause significant changes in the shape of UFT. Increasing awareness on the sustainability issues forces all public and private actors to take actions for contributing to the environmental, economic and societal sustainability. Technological developments in goods' distribution vehicles brings new and more environment friendly devices such as electrical vans and cargo bikes. Office depot (Browne et al., 2011), Binnenstadservice.nl (van Rooijen and Quak, 2009) and TNT Mobile Depot (Verlinde, 2015) are successful examples for the combination of electrical vehicles and consolidation centres. Despite such successful applications, Pelletier et al. (2016) argue that it will take longer time for electrical vehicles to become a common vehicle for goods' distribution in urban areas. Financial incentives, electricity sources, technology infrastructure and associated costs are the influential factors on the maturity of electrical vehicles. Drones are another significant development in parcel delivery industry. There is very limited amount of information about how the drone network will work but these types of methods for delivering goods in urban settings will trigger new discussions about their diffusion in markets which may be constrained by several factors including a lack of scale economies, limited value-add and regulation (Schliwa et al., 2015; Rawn, 2015; McKinnon, 2016).

Yet another development will occur in the logistics and supply chain trends and their relationship with UFT. Kant et al. (2016) anticipates that new collaborative models for city distribution need to be applied in urban infrastructures. The key initiatives will originate from city hubs, which will enable horizontal collaboration among transport operators as well as the receivers and redefine the role of all public and private actors involved. E-commerce and increasing rate of parcel deliveries will play major role in bundling the last mile in different consolidation schemes, in general supported by information and communication technologies.

2.4 Policy context in urban freight transport

Studies in policymaking apply a variety of models of the policy design process (e.g. Sidney, 2006; Howlett, 2014; Marsden and Reardon, 2017), which, although different, usually follow a similar pattern. First, policymakers try to understand why the problems they aim to mitigate occur and how they emerge (Marsden and Reardon, 2017). Subsequently, policymakers identify potential policy measures to address these problems, evaluating each option's costs and benefits. Finally, they make a choice (Sidney, 2006). This stage is crucial because different stakeholder priorities (e.g., policymakers, businesses, citizens) may lead to conflicts and challenges that may ultimately lead to the failure of certain policy measures (Marsden and Reardon, 2017). Ideally the last stage of the cycle is to evaluate if the policy measure has been successful and, depending on performance evaluations, policymakers can decide to modify or terminate the chosen measures. This section starts with presenting a critical analysis of policy formulation in general. Later, the studies that elaborate local transport policies affecting UFT have been analysed and finally, the existing studies have been analysed to identify the factors that influence the policymaking process in UFT.

2.4.1 Policy formulation

Improving the policy design process requires not only detailed knowledge of policy measures but also the context in which the process take place (Howlett, 2018). Part of this process is establishing the link between high-level policy goals, medium level policy objectives, and lowest level "on the ground" policy measures (Howlett and Cashore, 2009). In terms of transport policy, Marsden and Reardon (2017) concurred with Howlett and Cashore (2009) that there should be an interaction between policy goals and chosen policy measures; namely, policymakers need to make sure that chosen policy measures enable policymakers and institutions to achieve their goals and objectives. Part of this process is for policymakers to make their choices of policy measures by understanding their capabilities and limitations (Howlett, 2018). According to Marsden and Reardon (2017), current studies of transport policy do not investigate issues of policy context (including governance dynamics and power issues), resource availability and legitimacy.

The policy context as described by Marsden and Reardon (2017) includes the policy environment, the way in which stakeholders frame issues and power levels between stakeholders. These issues have been analysed through theoretical approaches by various authors, some of the most well-known being Kingdon's (1995) "multiple streams" framework investigating the influences that lead an item to the top of the political agenda, and the policy frames theory of Schön and Rein (1995) regarding how stakeholders use values and theories to frame a concept. The discussion on the role of power in policy processes is centred on formal and informal networks and governance dynamics, drawing on the large literature on institutional issues in policy, covering topics such as the interaction between formal and informal institutions (Rye et al., 2018) and how certain normative, coercive, and mimetic influences affect a convergence in policy design processes (Akgün and Monios, 2018). Marsden and Reardon (2017) point out that the existence of such influences casts doubt on the "technical-rational model" of much transport policy that implies that policies are selected based on rational analysis of their efficacy.

Financial and human resources significantly drive the choice of policy measures by public authorities, which can have a major impact on priority among policy aims (Howlett, 2014). This is particularly relevant for lower priority policy areas such as UFT (Lindholm, 2013; Lindholm and Blinge, 2014; Akgün et al., 2019). Public authorities enact certain regulations, either through their own choice or from higher level government requirement, yet without sufficient resources they cannot always implement or monitor them effectively (Lindholm and Behrends, 2012; Lindholm, 2013). Resources dedicated to UFT also vary between public and private actors. Howlett (2014) points out that different actors have different interests, resources and governing norms which all influence the selection of policies. Rose et al. (2016) explored how institutional pressures act on private freight providers, who must also juggle resources and legitimacy in the urban environment.

Legitimacy is important both for individual policies and for the public authority itself. In fact, political actors play the key roles in determining the policy goals and implementing policy measures in order to fulfil their objectives, but in some cases their policy choice is not derived directly from the policy goals but from a desire to gain legitimacy. One example is through transferring policies from other places, such as the rise of certification and accreditation schemes (Akgün and Monios, 2018). Public acceptability is highly influential when it comes to policy choice (Howlett, 2005). For instance, a scheme like a congestion charge can gain public support in Stockholm (Eliasson and Jonsson, 2011) while being rejected by the public vote in Edinburgh (Rye et al., 2008). Eliasson and Jonsson (2011) argued that acceptability increases with familiarity. In contrast to Edinburgh's experience with the congestion charge, Stockholm introduced the charging scheme first and then held the vote later. In this way, citizens were able to see the benefits of the scheme before making a decision. Therefore, the manner in which public acceptability is obtained is extremely important, raising the importance of collaboration which will recur throughout the discussions in this thesis. Christiansen (2018) found that citizens dissatisfied with the quality of transport services are also dissatisfied with the performance of local democracy.

2.4.2 Local transport policies affecting urban freight transport

The identification of UFT policy goals by local authorities is heavily influenced by other public authorities such as national governments and the European Union (EU). Reducing emission levels, reducing congestion, increasing road safety, enabling accessibility and providing mobility are the most common goals (Fossheim and Andersen, 2017). Local authorities choose a variety of policy measures to achieve these goals, which can be categorised in various ways. Stathopoulos et al. (2012) categorised policy measures in six categories: (1) market-based measures, (2) regulatory measures, (3) land use planning, (4) infrastructural measures, (5) new technologies, and (6) management measures. Kiba-Janiak (2017) classified the types of policies in five categories: (1) access conditions, (2) ecological freight transport practices, which refers to the implementation of policies based on collaborative actions such as FQPs, and logistics forums, (3) infrastructure, (4) land use management, (5) innovation & ideas, which refers to the introduction of clean and technological vehicles in executing UFT.

Access conditions include pricing schemes to decrease the level of congestion in cities, which can be varied for different times of day (Holguín-Veras et al., 2006). They may also encourage road users to use more sustainable modes of transport. However, it is a politically controversial topic as citizens strongly oppose these types of schemes (Schmöcker et al., 2006; Marsden and Groer, 2016). Access restrictions are the most common regulatory measure, based on vehicle tonnage and size (Ogden, 1992; Visser et al., 1999; OECD, 2003; Quak, 2008), as well as times and routes where certain vehicles are prohibited (Dablanc, 2008; Muñuzuri et al., 2005). However, according to OECD's (2003) report, access restrictions are not communicated adequately with other stakeholders such as retailers and freight operators and can even lead to increases in distribution costs and emission levels due to increasing number of round trips, total driving time and vehicle kilometres (Quak and Koster, 2007). Another type of access restriction is Low Emission Zones (LEZ) which restrict vehicles depending on whether vehicles meet a minimum standard for vehicle emission (Ellison et al., 2013), and which can accelerate the speed of freight operators in renewing their fleet and motivate manufacturers to consider making investments in vehicles' technology (Browne et al., 2005; Quak, 2015).

Specifically, ecological measures include air quality management areas, which are often enforced through legislation. Other types include vehicle recognition schemes (VRS), which are not usually a part of existing classification of policy measures, as they are voluntary initiatives. VRSs encourage and train freight operators to monitor and improve their environmental performance, operational efficiency (e.g. fuel saving) and road safety. Recognition programmes can be initiated by local authorities and regional transport partnerships through freight partnerships (Dablanc et al., 2013), through which they foster cooperation between public and private stakeholders. Infrastructure measures include consolidation centre schemes which are becoming more common in recent times, usually subsidised by the public sector to overcome private sector reluctance (Browne et al., 2005; Allen et al., 2012). Munuzuri et al. (2005) categorised land use policies in two groups as parking and building regulations. Designated loading and unloading bays (LUB) are the most typical example for parking related policies (Muñuzuri et al., 2005; Alho and Silva, 2014). Innovation and ideas are less common and involve high levels of collaboration with private operators to develop delivery and service plans (DSP) and freight route maps.

2.4.3 Influences on the urban freight transport policy process

Previous studies indicate that local authorities have recently started to shift their attention towards urban freight as a part of local transport planning (Browne et al., 2007; Lindholm and Behrends, 2012; Lindholm and Blinge, 2014; Kiba-Janiak, 2017; Fossheim and Andersen, 2017). There are now more venues to bring local authorities and other relevant stakeholders together such as research projects and freight partnerships. However, despite the increasing awareness and collaboration efforts, cities still encounter problems when dealing with UFT. For the most part, local authorities consider freight transport as an issue that private companies such as freight operators or receivers should take care of (Lindholm and Blinge, 2014). UFT is very much driven by commercial motivations between shippers, freight operators and receivers. However, UFT affects both the environment and the economy of cities, thus local authorities want to support existing businesses and to attract new businesses while at the same time protecting the environment and quality of life for citizens (OECD, 2003).

From the public sector perspective, local authorities struggle to implement their own regulations if they cannot get support from national governments or if they cannot find the required financial as well as human resources (May et al., 2008; Lindholm, 2013). Many initiatives and projects end shortly after their funding ends, particularly many UCC projects (Allen et al., 2012; Allen et al., 2014; Paddeu, 2017). Lack of support from governments and lack of resources mean that local authorities often are unable to identify policies that will help them balance economic, environmental and social interest of various stakeholders (Lindholm and Behrends, 2012).

As noted above, despite much research on UFT policy measures, only limited research has been published regarding the process of identifying and selecting these policy measures. However, there have been a handful of authors addressing the role of local authorities in managing UFT and interacting with other UFT stakeholders. Lindholm and Behrends (2012) studied the state of UFT planning practices in 12 cities from different countries in the Baltic Sea Region. The identified shortcomings were a lack of knowledge concerning the ways to include UFT in overall transport planning, a lack of role models and inadequate monitoring. The authors suggested that local
authorities need to work on developing a collaborative relationship with other stakeholders and understanding the complex nature of logistics.

Lindholm and Behrends (2012) also highlighted that land-use planning and transport planning should be better integrated, especially in new development areas. Ballantyne et al. (2013) surveyed freight stakeholders in five European countries and identified several issues, such as lack of UFT expertise in local authorities, UFT not being integrated in other aspects of urban planning and conflicts with non-freight transport policies. Lindholm and Blinge (2014) surveyed knowledge and awareness of sustainable UFT among policy planners in Sweden, finding that, as also found by Ballantyne et al. (2013), the majority of municipalities are lacking UFT data, which prevents them gaining sufficient understanding to choose and implement successful policies to accomplish transport goals.

Trust, curiosity of policymakers, and knowledge exchange between different parties are also considered key factors for learning and gaining understanding about policy measures (Marsden et al., 2011). Lindholm and Blinge (2014) also identified that restrictions (e.g. weight and time) are the most popular policies implemented at the local level but no significant evidence was identified concerning the motivations that lead local authorities to choose these policies. In addition, they found that very few of the local authorities surveyed monitor the performance of the implemented measures. The overall conclusion was the need to address issues such as lack of coordination, sufficient resources and knowledge transfer. The key issues found in these papers have been used to structure the data collection and analysis, in order to understand how local authorities, work with and attempt to resolve these issues when setting UFT policies.

Local authorities introduce policies to prevent all road users from potential threats caused by vehicle traffic in cities and to provide a prosperous and safe environment for residents, workers and visitors (Lindholm and Blinge, 2014). Local authorities regulate road traffic concerning particular issues such as road safety, transportation of dangerous goods, air quality standards, freight deliveries during particular hours (e.g. night-time delivery bans). Economic activities and the geographical clustering of these activities heavily affect the traffic flow coming into and going out of cities. Each individual transport system should be planned based on their individual requirements, and potential interferences between different systems should not make one or more system dysfunctional. For instance, illegal parking in loading-only bays or cycle lanes is a very common problem, which constrains the mobility of different road users.

Local authorities need to establish their local transport strategies and plans by considering the complex nature of the multiple transport systems. Despite the fact that local authorities increasingly recognise UFT in transport planning (Browne et al., 2007), policymakers in general have paid limited attention to designing specific UFT policies (Lindholm and Blinge, 2014). Passenger transport is generally prioritised over freight transport in cities, and when freight is considered it is at the national and international levels (Savy, 2012). Local authorities require advanced knowledge concerning how logistics systems work at the urban level, what transport requirements exist for various delivery operations (e.g. vehicle routing, demand planning, and delivery schedules) and demand patterns of customers. They need knowledge in order to implement effective freight policies and to be able to incorporate the needs of other transport systems (Lindholm and Blinge, 2014). The lack of attention is not particular only to local authorities, but also national and regional authorities often lack dedicated bodies that deal with freight transport related issues in cities (van Duin and Quak, 2007).

According to Cui et al. (2015), centralised national governments can make decisions concerning transport policies, planning and investments, which are insensitive to local transport issues. On the other hand, historically, national governments have an indirect influence on UFT through infrastructure and maintenance, land use policies and sometimes even providing funding for projects (Wittlöv, 2012). In recent years, public authorities have increased their understanding and awareness through putting more effort into data collection, cooperating with other stakeholders and participating in national and international projects (Ballantyne et al., 2013; Lindholm and Browne, 2013). The awareness of public authorities in developing effective freight and logistics increases in connection with the increasing awareness of the benefits of logistics as well as the adverse effects of road transport. Logistics as a sector supports local economies and ensures that people living in cities

receive goods and services at the right time and place. However, freight vehicles are also sources of air pollution, road casualties and congestion.

There are various policy actions that have been taken in order to assess the challenges of urban traffic including freight vehicles; however, these policies aim to restrict freight vehicles either for a period of time or on an ongoing basis such as time window restrictions, size restrictions and route maps (e.g. showing recommended and mandatory routes for vehicles). Even though these types of restrictions are becoming more common, they may not reflect the rapidly changing dynamics of urban economies and cities in the long run and they may have adverse effects on cities' economies as well as the environment (Macharis and Kin, 2017). This is mainly because consumers and markets are constantly going through changes that affect consumption patterns (e.g. increased variety of products, free shipping) and delivery patterns (e.g. same day or next day deliveries) (Kin, et al., 2017). This situation causes many commercial vehicles with very low fill rates to drive in cities, adding to the existing problems concerning congestion and air pollution.

Considering these changes and the challenges of urban areas, public authorities should be able to take further steps towards implementing policies that aim to improve UFT and to reduce adverse effects caused by UFT. Public authorities enforce policies such as time window restrictions or size restrictions and they often do not undertake any deep consultation with other stakeholders such as freight operators or receivers before implementing such policies. On the other hand, if public authorities (both local and national level) want to implement effective freight-focused policies, they need to involve other stakeholders in data acquisition (Gatta and Marcucci, 2016) and the policy design process (Stathopoulous et al., 2012), and they need to create partnerships that guarantee long-term relations and mutual understanding (Lindholm and Browne, 2013). Such early stakeholder involvement can lead public authorities to have a better understanding of the needs of freight operators and receivers. In addition, public authorities can communicate their objectives with operators and receivers concerning society, environment and the economy more clearly. It also helps public authorities to understand potential consequences of planned policies on logistics operations of other stakeholders.

As local authorities shift their perspectives more towards implementing freight focused and effective policies, there are various types of policies developed either by local authorities or developed as a result of a partnership between public institutions and private organisations. Each of these policies aims to address one or more UFT challenges. Clean air policies, low emission vehicles, consolidation solutions, designated loading and unloading zones, road pricing systems, real time information systems, shared use of public transport infrastructure and developing night-time delivery schemes are policies which are being observed in different cities. Yet Kiba-Janiak (2017) showed how different cities can be located at different points along a spectrum according to how "mature" they are in terms of taking an active role in UFT policy, with many cities only implementing very few or basic policies.

2.5 Urban Consolidation Centres

This section presents a critical review of previous studies focusing on UCCs. The review of the previous studies focuses on five specific facets. First, the section starts with presenting a comprehensive definition of UCCs in order to explain the typical characteristics of the phenomenon. The definition of UCCs is followed by the section, which discuss challenges that stakeholders come across with during the establishment of UCC projects. These challenges can appear in any stage of the development. If stakeholders tackle these challenges as early as possible during initial phases of the development, projects are more likely to be successful in the long term. If similar problems occur in later stages, stakeholders (particularly the initiating bodies) will be more experienced in dealing with those challenges. In the second part of this section, the studies that focus on stakeholder collaboration has been discussed. It is crucial for UCC projects to have an initiating stakeholder which is not only responsible for providing funding but also responsible for identifying other collaborators, implementing supportive policy measures and following up the projects continuously. This has been identified as one of the factors that guarantee the operability of UCCs in the long term.

Next, the use of supporting policies during the development of UCC projects has been discussed with respect to the findings of the previous studies. The implementation of local transport policies requires close collaboration between public and private stakeholders. The familiarity with policies at the local level is another key factor that ensures the successful implementation of local transport policies in combination with UCCs. A successful implementation would refer to the fact that operations of retailers and LSPs would not be jeopardised because of the supporting policies. Finally, the service offerings have been discussed as a part of UCC projects as service offerings enable closer collaboration between stakeholders whilst searching for financial resources.

2.5.1 The definition of an urban consolidation centre

UCCs became one of the frequently implemented logistics facilities in cities during the last two decades (Allen et al., 2012). These facilities focus on consolidating deliveries for the last mile of supply chains (Allen et al., 2012). Browne et al. (2005, pp.4) present the most recognised definition of UCCs, and they define the concept as *"as a logistics facility that is situated in relatively close proximity to the geographic area that it serves be that a city centre, an entire town or a specific site, from which consolidated deliveries are carried out within that area."* Cities face with the increasing number of traffic problems due to rapid urbanisation, agglomeration of retailing outlets and the rapid increase in e-commerce activities (Dablanc 2007, Lagorio et al., 2016; Björklund and Johansson, 2018). Congestion, noise, emission, and safety are the most common problems that cities have to tackle (Dablanc 2007; Björklund and Johansson, 2018).

UCCs are implemented to mitigate the common traffic problems in cities and provide services to increase operational efficiency for their users. Underutilized vehicle capacity is one of the greatest problems of UFT. Removing vehicles from the roads by enabling more efficient freight consolidation can help decrease congestion (Lebeau et al., 2017) and decrease the level of emission from vehicles, which would be on the roads otherwise (Paddeu, 2017). UCCs contributed environmental sustainability by enabling the use of more environmentally friendly vehicles such as electric vehicles (Allen et al., 2012; Allen et al., 2014). On the other hand, a study completed by Browne et al. (2011) showed that the distance travelled per parcel rose significantly as a result of electric vehicles having smaller capacity.

The definition of Browne et al. (2005) provides information about the basic features of consolidation centres in urban areas. UCCs can take various forms and they differ from each other with respect to types of ownership, types of funding bodies, points of destinations, types of goods handled by UCCs, types of users and terms of use (Allen et al., 2012; Allen et al. 2014; Björklund et al., 2017; Björklund and Johansson, 2018). Allen et al. (2012;2014) presented three major categories of UCC: (a) UCCs that serve all or part of an urban area, (b) UCCs that serve large sites with a single landlord such as shopping centres, and (c) UCCs that serve construction sites. UCCs in the first category usually handle retail and office products, and food supplies. UCCs can offer basic services (consolidation and delivery) or advanced, value-adding services such as stockholding, preparation of products for display (pre-retailing activities), and return and waste management (Allen et al., 2014; Johansson and Björklund, 2017). This thesis solely focuses on the UCCs which serve all or part of an urban area. They are initiated by public authorities, where public authority leads the project by collaborating other stakeholders such as LSPs, retailers, freight partnerships, private companies, and other public authorities and they provide the initial funding to develop UCC projects.

Last two decades, many UCC projects have been initiated. Public authorities were the main financiers in many instances (Allen et al., 2012). Head start is given to the projects with the funding from public authorities until UCCs become financially viable. Financial viability refers to the state that UCCs obtained the required number of users, and they can finance themselves. Another way that public authorities support the use of UCCs are through policymaking (Browne et al., 2005; Lebeau et al., 2017). UCC projects can also be initiated by private companies such as LSPs. Both publicled and private-led projects can serve to single or multiple users (e.g., only carriers, only retailers or the mix of both stakeholders). From the perspective of management, UCCs can be managed by a single private landlord (Paddeu, 2017) or by a coalition of stakeholders which are led by public authorities (Björklund et al., 2017). The use of UCCs can be mandatory or participatory (Allen et al., 2014).

Public authorities exclusively focus on delivering transport policies that enhance the three pillars of sustainability: economic, environmental and social. Mitigating problems such as congestion, emission, noise, and safety corresponds to sustainability goals of public authorities while initiating UCC projects. Economic sustainability is the other crucial pillar that is emphasised by stakeholders as participating retailers can obtain operational benefits through improved productivity of staff, pre-retailing, planned deliveries and outsourcing the recycling processes (Paddeu, 2017); while LSPs obtain benefits in terms of time savings and savings in other resources (e.g., vehicles, drivers) as they will not have to make deliveries in congested urban areas (Allen et al., 2012). Despite the various benefits, low acceptability from LSPs and retailers appear as a significant barrier in front of the implementation and long-term financial viability of UCCs. It happens mainly due to the fact that retailers and LSPs may need to bear cost increases when they use UCCs for their last mile deliveries (Browne et al., 2005; Allen et al., 2012; Nordtøme et al., 2015). The challenges related to economic and operational aspects will be discussed in detail in the next section.

2.5.2 Challenges faced during the development of UCC projects

De Marco et al., (2018) analysed 70 European cities that have been piloting or implementing UFT policy measures. UCCs has been identified as one of the most popular policy measures implemented in these cities. Despite its popularity, particularly publicled UCC projects have become counterproductive in many instances because local authorities are often lacking to develop a certain degree of knowledge concerning UFT and related interest groups. The biggest challenge facing UCCs is their financially viability (Kin et al. 2017; Janjevic and Ndiaye 2017). Over the years, freight operators have become particularly successful at consolidating freight during the earlier phases of their supply chains. Therefore, it is less attractive when UCCs are added as an extra link in supply chains, leading to increased set-up and operating costs. As consolidation operations usually take place before freight vehicles travel to city centres, using UCCs may not obtain any operational and economic benefits for freight operators (Browne et al. 2005). However, Browne et al., (2011) identified that it is still possible to achieve other benefits for highly consolidated goods, such as improvements in air quality with the help of electric vehicles and decreasing the total distance travelled by conventional vehicles. Kin et al. (2017) argued that the feasibility of UCCs depends on availability of a critical mass and the conditions in areas that deliveries take place such as restrictions or congested traffic.

Cost is one of the most crucial factors to decide whether customers are willing to use a UCC or not. Janjevic and Ndiaye (2017) argue that a UCC should be able to decrease delivery costs through providing gains in terms of distance and time. They identified the key factors influencing the cost attractiveness of UCCs as the distance to UCCs and enabling out-of-hours deliveries (OHD), factor and pricing of services, the density of the delivery zone and the size of cities, and the mode of management. According to Aastrup et al. (2012), customers favour less frequent deliveries as a result of the agglomeration of parcels. Another problem that UCCs face is the challenge in establishing a business model that can balance economic, environmental, and operational requirements for different stakeholders (Quak et al., 2014; Nordtømme et al., 2015; Björklund, et al., 2017). The lack of an appropriate business model can also lead to contractual and organisational problems and loss of direct contact with suppliers and customers (Browne et al., 2005; Allen et al., 2012). Lagorio et al. (2016) identified particular reasons why UCC projects fail at different stages of their implementation, such as discontinued public funds, location (if it is too far from delivery points) and lack of systems that enable tracking and tracing. The authors also identified that potential stakeholders hesitate to participate in UCC projects due to maintenance of customer service levels, security of goods, lack of involvement of stakeholders in decision-making processes and potential conflicts with local authorities.

2.5.3 Stakeholder collaboration during the development of UCC projects

The involvement of multiple stakeholders is one of the most critical characteristics of UCCs. Consortia that aim to initiate UCC projects are characterised by complex relationships between public and private actors over a period of time. Harrington et al. (2016) identified key considerations and interdependencies to be considered during the initial development of UCCs. The set of stakeholders consists of three main actors: freight operators/logistics companies, local businesses, and public authorities. Their study shows that each individual stakeholder seeks for his or her individual objectives and they need to have a set of common objectives if all stakeholders want to collaborate. In addition, the timing of stakeholder involvement is crucial, and they should be involved as early as possible in the development process (Macharis and Verlinde, 2012).

LSPs and transport providers mainly focus on generating revenues, developing in-house skills, enhancing their brand reputation, and using innovative tools to develop their businesses. Many international corporates such as DHL, Amazon and UPS focus on developing innovative solutions that will enable them to develop new ways of providing logistics activities in local settings such as using low emission vehicles, initiating micro consolidation centres or enabling multimodal transport (Quak, 2011; Ducret, 2014). As the final customer of the deliveries from the UCCs, retailers focus on the factors concerning the quality of the service that they obtain from their transport suppliers. Therefore, they focus on familiarity, reliability and flexibility in delivery operation, insurance, parcel aggregation and personal and friendly contact with transport companies (Harrington et al., 2016).

Public authorities want both to support existing businesses and to attract new businesses to be in their cities, which contribute to economic growth (Olsson and Woxenius, 2014; Harrington et al., 2016). At the same time, both national and local authorities have a responsibility to protect public health and wellbeing and quality of life in cities, which means they need strategies to reduce emissions and congestion. Therefore, UCCs and the use of low emission vehicles are starting to be adopted in some cities (Browne et al., 2011; Paddeu, 2017). Many local authorities in Europe have already included the promotion and the use of low emission vehicles in their planning for both passenger and freight transport (Muñuzuri et al., 2005; Dablanc, 2007). All the stakeholders can develop a common agenda and strive for the same goals while considering their individual objectives. In this way, stakeholders can agree upon how they will initiate UCCs, share cost and risk and develop ideas concerning what other policies and initiatives they need to increase the effectiveness of UCCs. van Duin et al., (2018) identified four key elements to stakeholder collaboration in UFT, which will be used in the analytical framework: the need for public action, awareness of barriers, building on large players and empowering small players.

2.5.4 Use of supporting policies during the development of UCC projects

Local authorities are beginning to combine the use of UCCs with other type of policies that offer exemptions and incentives for receivers as well as freight operators, however, there has been only limited attention to this topic in the literature. Panero et al., (2011) examined 39 existing UCCs according to multiple factors such as economic

profile, the nature of goods accepted, areas served, vehicles used, type of leadership, existence of favourable regulations (or supporting policies), their compulsory or voluntary nature, and temporary or permanent scope. They pointed out that legislative measures implemented by local authorities can help the development of UCCs in two ways; either UCCs can cope better with restrictions if they use appropriate resources (e.g., low emission vehicles) or restrictions can be lifted for the UCCs' vehicles. Lebeau et al., (2017) drew on the work of Panero et al., (2011), but focused purely on the role of supportive policies, and expanded the analysis to 61 UCCs. Lebeau et al., (2017) divided the potential policies into financial support (start-up, structural and indirect), direct regulatory support (one compulsory UCC, license granted to transporters and favourable measures to UCC operator) and indirect regulatory support (time windows, weight restrictions, size restrictions, EURO norms, age of vehicles and urban toll). The former two categories are considered as related to the overall business and financial model, while the third category relates to supportive transport policies.

It should also be recognised that there is a fine line between encouraging stakeholders to use UCCs and cooperate during projects and obliging them to use UCC by implementing other policies. Local authorities should implement policies that will not result in increasing the cost of transport, which later will be reflected in the costs of receivers and freight operators (van Duin et al., 2018). Local authorities need to analyse cultural, economic and political drivers that affect their choice of policies and their public acceptability. While local authorities see restrictions (e.g. time window, size) as useful tools to increase the use of UCCs, freight operators may see such restrictions as an inefficient way of initiating UCCs. In addition, operators can argue that shippers should be able to choose how their products will be shipped and they can tailor their operations according to the market's demands (van Duin et al., 2018).

A few authors have examined specific policies in case studies. Marcucci and Danielis (2008) showed that the share of traffic attracted to a UCC can be increased by implementing policies such as full public subsidy (29% increase), increasing access fees to limited traffic zone (27%) and a mix of these policies (as high as 78%). Ville, et al. (2013) studied a case of a UCC in Vicenza, where the local authority limited the access to limited traffic zones to promote the use of the UCC. These restrictions

imposed by the public authority led freight operators to challenge this decision in court as they found the restrictions to be barriers to running their operations effectively under fair conditions. Allen et al. (2014) found that the local authorities in Bristol granted UCC vehicles access to bus lanes in the trial period of the scheme, with the aim of shortening delivery times to the shops. Björklund et al. (2017) studied Lucca Port UCC in Italy, where the entrance to the area is restricted by fees as a part of local traffic regulations. The local authority of Lucca offers financial incentives to LSPs, who want to transfer their deliveries through the UCC. The authors found that the fees and the incentives were vital for the long-term commercial viability of the UCC. Marcucci and Gatta (2017) measured the willingness to accept OHD in Rome. The authors measured retailers' responses for assisted OHD, unassisted OHD and the use of OHD in combination with the use of UCC. Their results showed that the combination of OHD and UCC was the most preferred method across the retailers.

2.5.5 Service offerings at urban consolidation centres

According to Björklund et al. (2017), a viable business model for a UCC should be able to adapt to a dynamic environment and innovate new services to generate more revenue. Business models need to ensure the balanced distribution of costs and risk among the stakeholders (Johansson and Björklund, 2017), often involving a public subsidy to guarantee that users will not be penalised financially, at least in the start-up phase (Allen et al., 2014). Each UCC user, whether an LSP or a retailer, seeks to obtain financial and operational benefits. Benefits can vary based on the type of users; for instance, LSPs could send fewer vehicles to busy city centres as they subcontract a part of their last mile deliveries to UCCs. Retailers can benefit from service offerings such as storage and labelling (Johansson and Björklund, 2017). These service offerings can become additional sources of revenue for UCCs as retailers usually pay for services offered by UCCs. In addition, the ability of developing service offerings indicates that UCCs can develop and adopt their business models to a dynamic environment, which is characterised by different expectations and requirements of different stakeholders (Björklund et al., 2017). Existing studies mention a variety of services that can be offered by UCCs such as providing off-site storage space, preretailing activities, waste management and recycling, e-commerce services,

information system enabling tracking and tracing, and customised delivery days and times for the users (Browne et al., 2005; Johansson and Björklund, 2017).

In one of the earlier and the most comprehensive studies of UCCs, Browne et al. (2005) argued that UCCs help retailers to reduce the need for storage and logistics activities in their premises by offering storage facilities and pre-retailing services in advance. Aastrup et al. (2012) conducted a case study on retailers in Copenhagen to investigate third party logistics services in the context of city logistics and identified that a UCC can offer its receivers the flexibility of influencing delivery times. Similarly, Paddeu (2017) identified that the most popular UCC services used by retailers are storage and recycling of packaging, but other benefits of using the UCC related to being able to set delivery times and ensuring product safety. On the contrary, Johansson and Björklund (2017) did not identify a need for flexible deliveries and a demand for handling waste management. The authors also identified that reduced expenses due to using service offerings do not convince retailers to pay for using UCCs, and therefore suggested that the first step should be to understand actual logistics needs of retailers and to identify potential venues that will provide economic advantages when particular services are outsourced to UCCs. Gammelgaard, et al. (2017) also mentioned the importance of understanding the rationality of retailers' systems and improving communication of potential service offerings, thus involving retailers as stakeholders in co-creating value.

2.6 Retailers and the use of urban consolidation centres for their deliveries

This section reviews the studies, which are at the intersection of retailers and UCCs. First, the benefits of using UCCs in general and specifically in the context of retailers have been discussed. The existing studies showed that UCCs can provide logistics support to small/medium size retailers, which do not have a centrally managed supply chain network. Second, the challenges of using UCCs have been identified from the perspective of retailers and in general. The biggest concern is the cost that the users of UCCs need to pay. Another common concern is related to the loss of control as end customers, retailers in this case, do not want their products to be handled one more time along the supply chain due to security and time related concerns. The third section

provides an analysis of policy measures and their implication particularly on retailers. In the last 10 years, the research on various policy measures and testing their implication on retailers gained significant attention as researchers realised that local policy measures can cause great obstacles as well as opportunities can be obtained from the implementation of local policy measures such as out-of-hours deliveries. Finally, the last section presents a review of willingness of retailers to accept operating under particular policy measures. The review particularly focused on the type of policy measures, which make retailers willing to pay for using UCCS.

2.6.1 Benefits of using urban consolidation centres for stakeholders

UCCs are planned to mitigate various externalities such as congestion, air pollution, and road safety (Browne et al., 2005; Allen et al., 2012; Allen et al. 2014), which makes UCCs as one of the beneficial initiatives for cities. Consolidation helps to improve the load factor of vehicles making deliveries in congested locations. Load factor became a significant problem due to changing patterns in supply and demand of freight transportation (Kin et al., 2017). As many vehicles are running half empty and contributing to congestion, air pollution and the probability of collision between vehicles and vulnerable road users, public authorities want to mitigate these problems to be able to provide healthier, safer and a more vibrant environment to their citizens (Browne et al., 2005; Dablanc, 2007).

UCCs can enable reductions in the level of carbon emission and the other pollutants in connection with the reductions in the total distance travelled in urban areas (Allen et al., 2012; Allen et al., 2014). Fewer goods vehicle is also associated with reductions in conflicts between vehicles and other road users (Allen et al., 2012; Allen et al., 2014). In addition, the improved load consolidation can reduce the total kerbside time and space occupied by vehicles making on-street deliveries, thereby it will help further reducing the impact of freight operations on congestion (Browne et al., 2005). These benefits of UCCs are specific to environmental and societal benefits of having UCCs and usually local authorities want to achieve these benefits.

UCCs provide benefits for other stakeholders such as LSPs and retailers. Allen et al. (2014) identifies some direct benefits for logistics companies such as less vehicle trips, fewer vehicles needed, scope for renewable fuels, scope for non-road modes, shorter unloading times and increased load utilisation. These potential benefits have direct impacts as well as indirect impacts on local authorities' goals on reducing congestion, reducing air pollution, and increasing road safety. UCCs also offer benefits for retailers; these benefits are related to UCCs' features of transport, storage spaces and pre-retailing services. Through these features, retailers can obtain benefits from having more sales space and product availability (Allen et al., 2014; Paddeu, 2017).

Pre-retailing services consist of the type of services for preparing the parcels (e.g., tagging, preparing shelf displays, repackaging) products to be ready for sale. These services enable shop owners as well shop keepers to deal with less queuing at checkouts, less unpacking and waste handling (Johansson and Björklund, 2017). Shops can have more time to assist their customers and to train members of staff (Allen et al. 2014; Johansson and Björklund, 2017). More storage space enables retailers to extend their product range and products' variants (Browne et al., 2005; Allen et al., 2014; Paddeu et al., 2017). Finally, the transport features of UCCs enable retailers to contribute to the protections of the environment by receiving their deliveries with low emission vehicles and improved waste handling (Browne et al., 2005; Browne et al., 2012; Allen et al., 2014; Paddeu et al., 2017).

The existing research also shows that retailers would experience fewer stockouts because of stocks that could be held at UCCs (Allen et al., 2014; Paddeu, 2017). There are various studies, which elaborates the potential benefits of UCCs in general and particularly for retailers. However, there are very limited studies that investigates these benefits in real life settings due to two particular reasons; first, there are few UCCs, which are successfully working until this date. Second, it is challenging to design large scale case studies that targets retailers due to time and resource constraints. However, Johansson and Björklund (2017) and Paddeu (2017) fill this gap by investigating potential benefits of UCCs and the level of satisfaction of the retailers, which use UCCs for their deliveries as well as other logistics related requirements.

Johansson and Björklund (2017) explored retail stores' potential demands for different services that a UCC could provide to foster the development and implementation of UCC solutions aimed towards more economically feasible business models. The authors aimed to validate two hypotheses: First, the use of UCC services might increase the capacity of a store to improve customer service. Second, it is possible that cost savings could be achieved when activities are moved from the store to the UCC. The results from 72 interviews in six shopping malls showed that the potential to further improve customer service at retail stores might not be achieved with the implementation of a UCC. The retail stores have found solutions that allow them to maintain the level of customer service that they seek. The authors identified that the stores invest in their logistics resources exclusively; however, costs savings can be achieved if required logistics activities are supplied by UCCs. Economic advantages can be found by, for instance, offering additional storage in areas with lower rental costs or moving logistics activities to the UCCs. The authors argue that their findings point to a need for understanding the actual logistics demands of stores.

Another study has been carried out by Paddeu (2017) which is similar to the study done by Johansson and Björklund (2017). The author investigated the services that users receive from the UCC, advantages and disadvantages of using the UCC and whether the users are satisfied with the services offered by the UCC. A survey has been carried to investigate advantages and disadvantages of using the UCC and how satisfied the users are by the services. The first part of the questionnaire aims to describe the delivery service by analysing: delivery frequency, number and size of delivery, security of delivery, and on-time delivery.

The second part aims to investigate the level of satisfaction with the services provided. 81 retailers (out of 500) currently use the UCC. The sample consists of 21 retailers who are using the UCC more frequent than the rest of the users. The results show that the same number of retailers use the UCC since it has been established in 2004. However, the results revealed that subsidies play an important role in establishing long term relationship between the UCC and its users. If subsidies would stop, the UCC may have financial issues to provide the service. Most frequently mentioned benefits are delivery to the stock room and security of delivery. Most of the users are very satisfied with the time and the frequency of the deliveries. All interviewees highlighted the high importance of the relationship with the UCC's staff. Safety of deliveries and damaged deliveries were two main concerns raised in the survey.

2.6.2 Challenges of using UCCs for stakeholders

Cost is the biggest concern for all stakeholders that are involved with establishing and using UCCs. Particularly, financial viability is the main concern for UCCs' long-term viability. The problems concerning financial viability if UCCs are initiated by local authorities, direct financial support and indirect financial support are the two most common tools to start up UCCs (Lebeau et al., 2017); however, the evidence shows that as soon as public subsidies end UCCs do not survive (Kin et al., 2016; van Heeswijk et al., 2019). When UCCs are added as an extra link in supply chains it leads to increased set-up and operating costs; therefore, retailers as well as LSPs do not prefer receiving their deliveries through UCCs unless local authorities subsidise these costs.

Although dell 'Olio et al. (2017) found that usually receivers are not willing to change how they receive their goods, especially if such change involves increased costs (either in terms of time or money) Janjevic and Ndiaye (2017) argue that a UCC should be able to decrease delivery costs through providing gains in terms of distance and time. For instance, retailers prefer receiving less frequent deliveries as it will leave retailers with more time for assisting customers, planning their workspaces, and personnel (Browne et al., 2005; Paddeu, 2017). Janjevic and Ndiaye (2017) also identified the key factors influencing the cost attractiveness of UCCs as the distance to UCCs and enabling OHD, factor and pricing of services, the density of the delivery zone and the size of cities, and the mode of management.

Another problem that UCCs face is the challenge in establishing a business model that can balance economic, environmental, and operational requirements for different stakeholders (Quak et al., 2014; Nordtømme et al., 2015; Björklund et al., 2017). The lack of an appropriate business model can also lead to contractual and organisational problems and loss of direct contact with suppliers and LSPs (Browne et al. 2005; Allen et al. 2012). Lagorio et al. (2016) identified particular reasons why UCC projects fail at different stages of their implementation, such as discontinued public funds, location (if it is too far from delivery points) and lack of systems that enable tracking and tracing. The authors also identified that potential stakeholders hesitate to participate in UCC projects due to maintenance of customer service levels, security of goods, lack of involvement of stakeholders in decision-making processes and potential conflicts with local authorities.

2.6.3 Implications of policy measures on retailers

2.6.3.1 Understanding the stakeholders in UCC operations

Various stakeholders with heterogeneous needs make transport systems more complicated and it becomes more challenging for policymakers to implement reasonable policies. Chosen policies need to influence economic, social and environmental sustainability as well. The existing studies show that policies ensuring the pillars of sustainability may not be convenient for stakeholders of UFT such as retailers, freight forwarders. In recent years, research has focused more on the evaluation of policy measures on various stakeholders. Retailers are particularly important because they are one of the crucial facilitators of economic activity in cities and they trigger urban freight deliveries, whilst UCCs are one of the innovative logistics solutions on city levels.

Local authorities show a great interest in implementing UCCs over the years. Business models in the context of UCCs are highly investigated. Researchers paid significant attention on understanding the dynamics of economically viable UCCs as half of the UCCs were shut down between either shortly after they started their operations or before they became fully operational. This has been identified by Allen et al. (2012) through a review of 114 UCC projects established between 1970 and 2010. With public authorities being very keen on the implementation of UCCs, they often provide financial subsidy to operationalise the projects. However, many projects failed just after ending public subsidies. Now we know that economic viability of UCCs depends on various political, strategic, environmental, and operational variables (Björklund et al., 2017).

Public subsidies will not help them to survive in the long term as there are examples showing that many UCC projects have failed after public subsidies stop (Allen et al., 2012; Quak et al., 2014), but they definitely provide support during the establishment and medium-term development stages. The aforementioned variables are concerns of multiple stakeholders such as retailers, LSPs, public authorities, residents, and business associations. For UCCs to become viable in the long term, there should be enough demand to make a UCC profitable and stakeholders should be willing to pay for using a UCC. Willingness to pay is heavily depending on the benefits that various stakeholders obtain via using a UCC.

Retailers pose a great importance for UCCs as retailers create the demand for freight deliveries in urban areas. Retailers play a crucial role in bridging supply and demand in the market as they trigger the production of goods and services on the supply side based on consumers' demand. Johansson and Björklund (2017) argue that retailers would gain the most benefit considering their potential to receive UCC services designed to meet their specific needs. UCCs can offer services such as pre-retailing activities (e.g. labelling, tagging, packaging or package removal), waste management, stockholding (e.g. providing floor space), customised delivery schedules. These services provide retailers with better inventory control, spending less time on in-house activities and more flexible and reliable delivery times (Browne et al., 2005; Browne et al., 2011). Influencing delivery times can enhance retailers' planning abilities with regard to staff and space planning in their shops (Aastrup et al., 2012; Johansson and Björklund, 2017).

Even though value services offered in UCCs can improve retailers' operation efficiency, whether retail stores have any interest in using UCCs for deliveries as well as UCC services remains unclear. Retailers usually opt out as soon they are expected to pay for UCCs and any related services offered (Verlinde et al., 2012). The number of studies investigating the conditions, which increase the retailers' willingness to pay for UCCs, is limited. Danielis and Marcucci (2008) investigated the impact of more stringent traffic regulations, full public subsidy, and improved time efficiency in order to identify retailers' reactions towards paying for UCC and services. Their results showed that while time efficiency affected retailers' perceptions the least, the most influential factor was the full public subsidy. Implementing supportive policies also work well on influencing retailers' decisions to pay for UCCs.

Particularly in recent years, local authorities started to build a great deal of knowledge about mitigating delivery related problems and accommodating deliveries in combination with other transportation systems (e.g., public transportation, pedestrian mobility, cycling). Supporting the implementation of UCCs with other local transport policy measures and offering exemptions and incentives for receivers as well as LSPs. There has been only limited attention to this topic in the literature.

Local transport policies can help the development of UCCs in two ways; either UCCs can cope better with restrictions if they use appropriate resources (e.g., low emission vehicles) or restrictions can be lifted for the UCCs' vehicles (Panero et al., 2011). Based on the reviews carried out by Panero et al. (2011) and Lebeau et al. (2017) the most popular policies and incentives that implemented to support UCCs are financial support (direct/indirect), allowing UCC vehicles longer time in pedestrianised zones, LEZs (defining engine standards), congestion charge, size restrictions (length, weight), discounts on entry fees to limited traffic zones, reserved loading areas, allowing to use dedicated bus lanes, and offering OHD.

Ville et al. (2013) studied a case of a UCC in Vicenza, where the local authority limited the access to limited traffic zones to promote the use of the UCC. Björklund et al. (2017) investigated the case of Lucca Port UCC in Italy, where the entrance to the area is restricted by fees as a part of local traffic regulations. The local authority of Lucca offers financial incentives to LSPs, who want to transfer their deliveries through the UCC. The authors found that the fees and the incentives were vital for the long-term commercial viability of the UCC. Finally, Allen et al. (2014) investigated the UCC in Bristol and Bath and how the local authorities granted vehicles access to bus lanes in the trial period of the scheme, with the aim of shortening delivery times to the shops. The existing studies revealed that the most popular supporting policy measures are time window restrictions in combination with pedestrianization, size restrictions (e.g., weight, height, length), urban tolls (e.g., congestion charge), direct regulatory support (e.g. compulsory participation, licencing), and LEZs (Panero et al., 2011; Allen et al., 2012; Lebeau et al., 2017). The most common incentives for UCC vehicles are to provide financial subsidy, to exclude them from the aforementioned restrictions and to give them road privileges such as giving access to bus lanes (Allen et al., 2012; Ville et al., 2013; Nordtømme et al., 2015; Björklund et al., 2017).

2.6.3.2 Social, financial, and operational implications of policy measures on retailers

The local transport policies aimed at receivers (e.g., retailers) of goods gained less attention in comparison to other stakeholders such as carriers. There are few contributions that consider local transport policies, which solely focus on commercial retailer activities. Therefore, a limited information exists concerning the attitude of retailers towards policy measures and how they react to potential changes in local transport policies (Stathopoulos et al., 2012). Time window restrictions and OHD are the most popular policies that have been investigated in the context of retailers and jointly in the context of carriers and retailers (Quak and Koster, 2007;2009; Holguin-Veras, 2008; Holguin-Veras et al., 2007a; 2007b; 2016). There are very few studies focus on UCCs from stakeholders' perspectives particularly from the perspective of retailers (Johansson and Björklund, 2017; Björklund et al., 2017; Paddeu, 2017).

Some of the studies in the first category (Quak and Koster, 2007; 2009) analysed the impact of policy measures (time window and size restrictions) with respect to retailers' product types, type of logistics network (central, decentral, number of DCs), delivery frequency and delivery methods (freight operators vs. own account). Marcucci and Gatta (2017) also look at behavioural changes of retailers when choosing a particular policy measure to adopt with respect to types of businesses and operational characteristics (chain stores or individual stores). It is important to understand how characteristics of businesses, product types, types of industries and logistics networks influence their decision when adopting a policy measure or they are affected on varying levels (from financial and operational perspective) when restrictions are applied. Understanding the characteristics and potential impacts of policies help policymakers to implement policy measures that will balance needs of various road users and will not target the favour of specific groups while neglecting others.

Browne and Gomes (2011) studied the consequences of different restrictions on distribution operations in urban areas. Restrictions were classified as supply chain internal restrictions and external restrictions. The internal restrictions refer to those imposed by any members of the supply chain, such as customer delivery windows, depot working hours. The external restrictions relate to restrictions imposed by external stakeholders or situations such as parking regulations or physical characteristics of the urban area. The customer delivery windows, nominated delivery days (internal) and traffic parking regulations (external) were reported to be the ones having the greatest operational impact. On the one hand, having to meet customer delivery windows and nominated days adds complexity and inefficiency to the operation. It is clear from the obtained results that having to cope with these restrictions comes at a high financial and environmental cost.

Browne and Gomes (2011) found that the nominated days restriction has a higher impact both in terms of financial cost and environmental damage than the delivery windows. It has been concluded that the definition of the delivery windows is not purely commercial in urban areas but the result of both legal parking requirements and commercial requirements. Second, the commercial reasons for maintaining delivery windows and nominated days are beyond the immediate control of the distribution operation. Control lies upstream in the supply chains and at the point when service levels and prices are agreed.

Daunfeldt et al. (2013) investigated if the introduction of congestion charge in Stockholm reduced the revenues of retailers located within and outside of the toll areas. The results have shown that congestion charges had no negative effect on retail businesses. The authors argued that this may be due to particular reasons such as (1) most stores and shopping malls are open evenings and weekends, (2) Using public transport or avoiding peak hours for shopping and (3) as parking is quite expensive in Stockholm, it may also be that car-borne shoppers are high-income earners who are less sensitive to congestion charges. However, the authors also argued that some retailers might still be affected by the congestion charge, especially those are located close to the cordon (inside and/or outside).

Koutoulas et al. (2017) investigated the impact of shifting deliveries of a retail chain to out-of-hour in Stockholm. The authors investigated the social costs and benefits, how these are distributed between stakeholders, and their effects on the everyday life and operations of all interested parties. Overall findings suggest that the financial benefits mainly consist of increased efficiency and productivity for carriers and receivers, reduced transport costs, fuel cost savings, and reduced congestion and accidents when trucks are moved from peak to out-of-hour hours. Social costs include increased noise levels and noise disturbances; additional staff requirements, equipment, and wage costs; and higher risks in handling goods deliveries at nighttime, especially in the case of unassisted deliveries. Freight operators obtain more benefits in comparison to the retailer. Retailer might need to bear the costs for increasing number of staff and wages. However, retailers become a part of a scheme which has social benefits such as reduced congestion and accidents. Jose Holguín-Veras has done various studies on out-of-hour deliveries to analyse the nature of the interactions between different stakeholder groups towards accepting to receive their deliveries during out-of-business hours. Two studies that were done consecutively by Holguín-Veras (see Holguín-Veras, 2008 and Holguín-Veras et al., 2007a; 2007b) model carrier-receiver decisions jointly that relate to time of the travel. The findings of these studies revealed that receivers are the main stakeholders that decide delivery times and their sensitivity to delivery options is largely dependent on the type of goods.

Another study of out-of-hour deliveries has conducted by Holguin-Veras et al. (2018) in New York, Bogota and Sao Paulo, which are three of the most populated metropolitan areas in the world. Their primary objective was to quantify the emission reductions that could be obtained from inducing a switch of deliveries from regular hours (6 AM to 7 PM) to off-hours (7 PM to 6 AM). The authors estimate and compare the direct environmental impacts (e.g., the emissions directly produced by the vehicles) of mid-size trucks operating during regular hours and off-hours in the cities. The case study consists of large receivers (grocery stores and department stores). The estimates for the off-hours revealed substantial reductions in emissions. The results indicate that OHD produces emissions that are 13% (Partial OHD) to 45–67% (Full-OHD) lower than those produced by deliveries made in similar routes during regular hours.

Quak and de Koster (2007) explore retailers' operations reactions and cost sensitivity to Time-window pressure and determine the dimensions that drive the retailer's time-window pressure sensitivity with respect to a retailer's product characteristics, network structure and logistical planning. The authors used fourteen cases from different cities in the Netherlands. The types of retailers include food (both fresh and dried), fashion and department store. They conclude that the impact of increasing time-window pressure varies among different retailers. The retailers that supply more stores during the time-window hours - thanks to the short distance, short unloading time, and larger drop size are affected the least. On the contrary, the retailers which use their vehicles most during a 24-h period in the current situation are affected the most by time-windows.

Another study done by the same authors (Quak and Koster, 2009) presented the impact of time windows, vehicle restrictions, and different retailers' logistics concepts on financial and environmental performances of retailers. The retailers are characterised as multinational chains with many stores, and they have their own distribution centres and products are supplied from these centres by their own trucks. The results showed that the cost impact of time windows is the largest for retailers who combine many deliveries in one vehicle round-trip. Cost increases due to vehicle restrictions is the largest for retailers whose round-trip lengths are restricted by vehicle capacity. van Rooijen and Quak (2010) analysed one of the well-established UCCs in the Netherlands called Binnenstadservice.nl. The analysis comprises local effects of the Binnenstadservice pilot after one year, such as air quality, inconvenience for residents and noise nuisance. Their results showed that fewer trucks enter the city centre and fewer kilometres are driven. The effects on local air quality and noise nuisance are limited, due to the amount of remaining passenger and bus traffic and the high natural background concentration of PM₁₀ and NOx.

2.6.3.3 Willingness of retailers to accept operating under particular policy measures

There are two branches of studies that focuses on UFT policy measures and their use for supporting the development of UCCs. Panero et al. (2011) and Lebeau et al. (2017) represent the first branch which examine the business models of various UCC projects and analyse the type of policy measures that have been used to support UCCs as a part of their business models. The second branch of studies perform ex-ante and ex-post analysis to measure the willingness to pay for using UCCs with respect to certain initiatives (e.g. tax reduction) and policy measures (e.g. lifting time window restrictions or increased entry fees to limited traffic zones). These studies are designed to measure retailers' behaviours in the case where retailers are given two policy choices, which are characterised by certain features, and they are asked to choose amongst different combination of these choices.

Marcucci and Danielis (2008) investigated the preference for using the UCC services instead of using a private vehicle for transporting goods within the city centre. The UCC alternative is characterised by (i) delivery cost per parcel, (ii) delivery time, (iii) tracking and tracing and (iv) warehouse availability. The use of private vehicles for deliveries is characterised by (i) average urban travel speed (ii) width of the delivery-time windows, (iii) distance of the available parking bay from the location of delivery, (iv) annual access permit cost per vehicle and (v) down-town vehicle restriction constraints. The authors performed their analysis in two steps: First, they performed stated preferences survey amongst 86 retailers located in Fano, Italy. They identified the potential demand for using the UCC is influenced mainly by the distance of the parking bay from the shop, by access permit cost, by the service cost of the urban freight consolidation centre, and by the delay in delivery time. Tracking-and-tracing service and warehousing do not have a relevant influence on choice. Also, vehicle access restrictions and average speed in the city centre had no role in explaining the choices of respondents.

On overall levels, only 13% of the respondents chose to use the services of the UCC. In the second step of their analysis, the authors introduced simulations to assess how the potential demand is affected by various incentives and regulations. They tested seven different incentives in addition to base scenarios, which has been shown to retailers during the first phase. First, they combine the base scenarios with only a single incentive such as removing the service cost for the UCC by providing public subsidises. Their findings showed that the probability of accepting the use of the UCC increased from 13% to 29%. In later scenarios, the authors implemented incentives and regulations jointly, which means they introduced the scenario of public subsidies combined with more strict regulations for using private vehicles for deliveries such as the increase in the cost of the city-centre-access permit and the introduction of severe parking restrictions increased the UCC choice probability to 44%. The authors also mentioned that businesses in garment and non-garment related industries show the highest acceptance to use the UCC as they do not require sophisticated logistic performances and services. Food and grocery businesses are moderately interested in the UCC, while bars, restaurants, and hotels, and medium-sized specialised stores show greater resistance as they need high frequency, punctuality and higher logistics overall quality.

In another study, Marcucci and Gatta (2017) investigated the potential for OHD across 198 retailers in the city of Rome, where limited traffic zones are in place. Off-hour deliveries consists of three attributes; first, assisted OHD characterised by deliveries performed in two different time slots and presence of somebody in the shop responsible for accepting the deliveries. The second attribute is the unassisted OHD characterised by deliveries performed in one-time slot without anybody being present in the shop and the last is the combination of UCC & OHD, which is characterised by deliveries received in a UCC at night and final consignment to retailers during regular business hours at the most preferred time on the next day via electric vehicles but having to pay an additional transportation cost. The authors performed a four-step analysis when investigating the retailers' preferences for using OHD; (i) preferences for different types of OHD (through correspondence analysis), (ii) willingness to adopt OHD (through stated choice), (iii) the role of the incentives and (iv) stated reaction to mandatory OHD.

In the first step of the analysis, the authors found that Unassisted OHD is relatively more associated to retailers belonging to the group of house accessories and stationery and to the few retailers, which are already performing OHDs. The assisted OHD is related by retailers belonging to food, hotels, restaurants, and cafes with personnel present in the shop also during evenings and early mornings. These types of retailers are characterised by long duration of unloading activities performed with, legally parked delivery vehicles. The UCC&OHD is more linked to clothing and other industries, where shops open only during regular business hours with a short duration of unloading activities performed via an illegally parked vehicle.

According to the results from stated preferences survey, the UCC and OHD attribute is the most preferred one across all retailers and the assisted OHD has the highest adoption rate with respect to the types of retailers. Their findings from the survey showed that the number of transport providers serving a given retailer negatively influences the probability of adopting OHDs, which the authors explained as it may occur due to the difficulties in coordinating the high number of transport providers having to shift their delivery times to off-hour. In the third step of the analysis, the authors offered seven different incentives to retailers to analyse whether the incentives play a role in motivating retailers to switch to using OHD. The results show that fiscal discounts on local taxes is the most frequently chosen incentive whereas green seller public recognition is the least preferred incentive by the retailers. In the last step of the analysis, the retailers are asked to state their reactions to mandatory OHD scheme. The results in this study showed that the retailers did not show a major opposition towards mandatory OHD scheme. However, 1.5% of the sample mentioned that they would show the most extreme reactions such as closing down their shops. Overall findings of this study suggest that approximately 60% of retailers are willing to adopt OHDs. The industries such as food, house accessories and stationery are more likely to participate. Retailers prefer UCC and OHD the most and UNASSISTED the least.

Last, dell' Olio et al. (2017) analyse the behaviour of retailers in two Spanish cities (Santander and Barcelona) to identify the willingness to use willingness to use two new distribution practices: Off-Hour Deliveries and an urban consolidation centre. OHD is characterised by (i) reduction of taxes as a fiscal incentive from the public administration, (ii) delivery timetable with various possibilities, and (iii) delivery method with three possible levels: staffed delivery, carrier to an external warehouse and carrier to an internal warehouse. The UCC measure is characterised by (i) reduction of stock at the retailer's premises, (iii) distance between the retailer and the UCC and (iv) delivery timetable from the UCC. The findings of this study showed that regarding the OHD policy, deliveries made between 04:00 and 06:00 generate disutility to the receivers in Santander. If taxes are reduced by 5%, more retailers prefer using the OHD policy in Santander than in Barcelona. With respect to the UCC policy, an attempt to locate the UCC as close as possible to the retailers' premises in the case of Santander and allowing a stock reduction of 30% in the case of Barcelona would result in increases in acceptance rates in both cities.

2.7 Summary

This chapter has started with providing a short background review for understanding UFT, the importance of freight transport for cities, obstacles, and mitigation strategies that have been established by public authorities as well as private companies. The purpose of the review was to place the research in a context and to show developments in the area of UFT to the present day. Second, the theoretical foundation of the thesis has been discussed under the policy context in UFT and this review has shown that policymaking in the context of UFT can be evaluated and redesigned by using theories in the area of policymaking. Later sections presented a detailed review of UCCs and

the use of local transport policies as supporting mechanisms. UCCs have been chosen as the example to analyse the disaggregation of the policy elements in UFT from mainly the perspective of local authorities.

This chapter also presented the gaps in literature associated with the processes of UFT policymaking and the identification of the disaggregated policy elements. There is a lack of knowledge concerning how local authorities make policies, how they consider their goals as well as objectives, and how they identify on-the-ground requirements to choose and implement the necessary policy measures to regulate freight traffic in cities. It has been identified that UCCs are the particular policy measures, which public authorities were failing to implement. The evidence showed that the disaggregating of the policy elements has not been addressed properly as many public led UCCs failed as soon as public funding has finished. Involved stakeholders would not be willing to take projects further due to financial and operational reasons. Local authorities develop models to implement successful UCC projects and implementing supporting policy measures is one of the solutions that local authorities put in place to incentivise the use of UCC amongst LSPs and retailers. Designing UCCs as policy packages is a topic gaining attention in recent years. Analysing UFT policy measures from the perspective the policy disaggregation could be a promising area of research which may help local authorities to gain a better understanding in UFT and policymaking in the context of UFT.

CHAPTER 3 : METHODOLOGY AND RESEARCH DESIGN

3.1 Introduction

This chapter will discuss the overall methodological approach to the research project, the methods adopted to collect data and the methods of analysis through which conclusions may be drawn. Potential limitations of the research design and ethical considerations will also be discussed

3.2 Philosophical approach

In every research project, researcher(s) adopt certain philosophical approaches, which can be defined as a set of beliefs that guide the further actions of the researcher while designing the study (Creswell, 2014). The goal of a research process is to test and/or develop theories by refining the existing theory base, expanding the knowledge base or generating new concepts (Arlbjørn and Halldorsson, 2002). When researchers work on creating knowledge as a result of their research activities, they rely on certain theoretical lenses (also called position, reference point or stance). Epistemology and ontology constitute the frame or theoretical lens of an individual researcher. Epistemology describes the assumptions researchers make about their knowledge of reality and their beliefs regarding how they come to obtain or understand that knowledge (Knight and Cross, 2012).

Ontological debate focuses on the nature of the reality, namely dealing with whether the researcher views the world from an objective or subjective viewpoint (Arlbjørn and Halldorsson, 2002). The most common ontological stances in social sciences are objectivism and constructionism (also mentioned as constructivism). Objectivism claims that an external reality exists independent of any beliefs or understanding (Ritchie et al., 2014) and phenomena under investigation are independent from the actors (Bryman, 2016). Constructionism claims that social phenomena are produced through social interaction and in a constant state of revision. This is mainly because the constructivist view argues that reality can only be known through the human mind and socially constructed meanings. Therefore, social phenomena will go under a revision process as soon as the human mind and social constructions are subject to alteration. Critical realism is another stance that is taken by researchers in social sciences. Critical realism distinguishes between the real world and the observable world. The real world can only be observed through human perceptions, theories, and constructions and it is constructed from our perspectives and experiences, through what is observable (Bhaskar, 2008).

This thesis falls within the critical realism paradigm. The aim of the thesis is to investigate the process of policy elements' disaggregation and the evaluation of policymaking processes in the context of local authorities in European cities. This thesis adheres to the view that the external reality exists in diverse and multifaceted forms, and the goal of research is to capture the complexity and depth of reality (Snape and Spencer, 2013). UFT and the state of local authorities establish the external reality that exist in multifaceted forms. Yet this thesis aims to capture the complexity and depth of UFT and local authorities with the help of the theory that explains the disaggregation of policy elements.

The approach of this thesis towards the research problem is inductive. Inductive reasoning can be defined as reasoning from particular cases to general principles. As this thesis aims, studies adopting inductive approach aim to build and/or expand theories rather than testing a theory. This research starts with investigating the framework developed by Howlett and Cashore (2009). Then it observes UFT related issues in the context of local authorities and identifies patterns of the policymaking processes to understand the impact of policy actions taken at the local level on the viability of UCCs. Finally, the results of this thesis expand the framework of Howlett and Cashore (2009) via investigating the process of policy disaggregation in the context of local authorities, and the implementation of UCCs together with supportive policy measures.

3.3 Overview of adopted methodology: Case study design

3.3.1 Justification for choosing a case study methodology

Schoch (2016; pg.245) defined case study research as a method that involves "a detailed and intensive analysis of a particular event, situation, organisation or social

unit." Case studies enable an in-depth investigation of a contemporary phenomenon within its real-life context (Yin, 1994). Also, case studies are particularly appropriate when investigating new areas or new instances of a known phenomenon (Eisenhardt, 1989). Qualitative case studies have been used to investigate the process of policymaking in local authorities in the context of UFT (context) by specifically focusing on the disaggregation of policy elements (phenomenon). Defining the research questions is the most important step to be taken because the type of the research question paves the way to choose the most relevant research method to be used (Yin, 2014).

Case study becomes an appropriate choice for "how" and "why" questions (Yin, 2014). The thesis topic has been divided to three key research questions and it starts asking how local authorities seek and select UFT policies. Then it focuses on UCCs to understand the process of the disaggregation of policy elements in the context of a particular initiative and the supporting policy measures. The second and the third research questions focus on how supportive UFT policies underpin the development of UCCs and their effect upon the willingness of retailers in using UCCs. Case studies are commonly used in the studies focusing on UFT and urban freight policy. Gatta and Marcucci (2016) reviewed studies evaluating UFT policies in order to investigate the relevance, the needs as well as the implication of the data acquisitions by looking at the methodological approaches adopted. The authors identified five approaches that are commonly adopted in past studies as simulation, stated preferences, personal critical assessment, multiple-criteria analysis, and case studies. They identified that case studies are the most common approach amongst all these categories.

3.3.2 Criticisms raised towards case studies and how to address them

Some criticisms have been raised towards the design of case studies and the methods concerning this particular approach has been used to build theories. The criticism mainly focuses on lack of rigour, generalisability of findings, and ensuring objectivity and reliability of qualitative research (Seuring, 2008; Yin, 2014). Seuring (2008) reviewed studies using case studies as a method and concluded that authors do not focus very much on describing the research process in fine details; rather the process has been described as a minor issue. Despite these criticisms, it is possible to ensure rigour and the quality of the research process via conducting case studies in a

structured way. Previous studies focusing on research methodologies present guidelines to help researchers to ensure the reliability, the rigour and the validity in using case studies.

There are various guidelines which sometimes can be confusing; however, they all aim to provide clear guidance to researchers via explaining critical measures to ensure rigour and validity. Researchers need to follow a stepwise approach and they need to document each step carefully in the process of generating knowledge with the help of case studies. The process of designing case study research starts with the formulation of the key research questions followed by the definition of the units of analysis, the selection of cases, and the design of data collection instruments (Eisenhardt, 1989; Yin, 2014). Later, researchers complete their field studies, the design of data analysis instruments, compare and contrast the findings to the existing studies and finally they reach a closure, all guided by the formulation of the research questions (Eisenhardt, 1989; Yin, 2014). A second criticism of the case study approach is that the level of effort can become unmanageable due to the time horizon of a case study and the amount of material obtained. On the other hand, clear definition of the unit of analysis and setting the boundaries to a case study will help researchers to make realistic plans about the level of effort that needs to be spent.

Definition of the unit of analysis is another component of the case study design. Yin (2014) suggests considering two important steps, which are the definition of the case and bounding the case. Definition of the case is highly dependent on the research questions. Each unit of analysis and related questions can call for a different case study. Each case study can have their unique research design as well as data collection strategy. The second element of the unit of analysis is to bound/delimit the case. Bounding the case indicates setting limits for the certain elements of the case study and it helps to define the context of the case clearly. For instance, time (life cycle of the case study), number of people (if unit of analysis is a small group of people) or number and type of organisation. Bounding the case will help the researcher first to determine the scope of the data collection and to distinguish data about the subject of the case study from data external to the case (Yin, 2014).

Generalizing from case studies is another common concern. Discussion about generalisation focuses on two dimensions; first, the type of generalization and second,

the number of cases used in a research project (single vs multiple). Research methodologies such as surveys and experimental designs require statistical generalisations, where "an inference is made about a population (or universe) on the basis of empirical data collected from a sample of that universe" (Yin, 2014; p.40). Different from surveys and experiments, case studies seek for expanding and generalising theories (analytic generalisation). Namely, Yin (2014) argues that cases used in a case study approach are not regarded as sample units as in experiments, instead case studies offer an opportunity to shed an empirical light about particular theoretical concepts or principles.

The second issue about the generalisability is related to the number of cases used in the studies. If the number of cases is too small, the study needs to face generalisability criticisms. On the other hand, if there are too many cases, researchers may face criticisms about the unmanageable level of effort. Siggelkow (2007) argues that given appropriate motivation and illustration, single case studies can offer a rich description of a phenomenon. Eisenhardt and Graebner (2007) state that multiplecase studies provide a stronger base for theory building in comparison. This is mainly because generalisability can be increased by using multiple instances. Also, multiplecase studies lead researchers to make comparisons, which clarify whether an emergent finding is peculiar to a single case or consistently replicated by several cases.

3.4 Design of the case studies per research questions

This section presents the design of the case studies based on the individual research questions. It also explains the characteristics of the case studies (single case study vs. multiple cases study), the selection of the sample, the data collection procedure and the procedures of the data analysis.

3.4.1 RQ1: How do local authorities seek and select local transport policy measures to regulate UFT?

The approach adapted in this study is exploratory in nature. Exploratory case studies aim to uncover niches which remain unexplored or have been covered only in a limited scale (Yin, 2011). A multiple case study design enables authors to apply replication logic through cross-case analysis, which is essential for increasing the generalization of the findings (Yin, 2009; Meredith, 1998; Miles and Huberman, 1994). The case selection for this study was based on the perspective of transport maturity introduced by Kiba-Janiak (2017), according to which cities can be located on different positions on a scale concerning how mature they are in terms of implementing freight-focused policies in their cities. Using this approach enables researchers to benchmark mature cities as a reference model for other cities to aim towards.

Three countries were chosen according to the maturity scale, based on secondary data collected from the existing literature, Local Transport Strategies (LTS), Local Transport Plans (LTP), Regional Transport Strategies (RTS), National Transport Strategies (NTS), various project reports, with Sweden considered more mature in terms of UFT policy, England medium and Scotland low. England and Scotland are treated as two different countries instead of being mentioned as the United Kingdom because due to the devolved political situation in the UK, transport responsibilities are devolved to the Scottish level. There are also differences in local and regional governance, which reflect on transport planning and transport implementation. For instance, in some areas England has combined authorities, which consist of the combination of neighbouring cities. In Scotland, the city councils produce LTSs while English councils produce LTPs (or RTS in the case of combined authorities). Combined authorities also produce LTPs; they sometimes call the document as LTS or just transport strategy.

For Scotland and Sweden, the four biggest cities (in terms of population) were chosen, however one of the cities from Sweden chose not to participate in the study. In the case of England, London was excluded from the list because of its unique nature and large size and the next four biggest cities, where a correspondent was available at the time of communication, have been selected. All case cities are major hubs with regards both to population and also economic wealth. The final list of cities consists of Stockholm, Gothenburg, and Malmö from Sweden, Greater Manchester, Bristol, Birmingham, Newcastle-upon-Tyne, Edinburgh, Glasgow, Aberdeen and Dundee. While the focus on larger cities may be considered a limitation, these tend to be the cities experiencing the negative aspects of increased UFT, particularly congestion and air pollution. The case study design requires a structured protocol for all cases (Yin, 2009), including documentary data collection and an interview guide. Secondary data analysis was used to obtain evidence about the transport governance situation in each country and city and identify their stated policy goals and other relevant information regarding their urban freight practices. In total, 15 interviews were completed with 16 respondents. The 15 interviews encompassed the local authority in each of the 11 cities, and in cases where the local authorities share responsibility for UFT with regional transport organisations, on the recommendation of the local authorities these regional organisations were also interviewed (regional transport partnerships in Glasgow, Aberdeen, Edinburgh, and FQP in Newcastle). Table 3.1 presents the public authorities, which have been contacted and the title of the interviewees.

The interview guide consisted of three sections: general, policies and policy processes, and was sent to the interviewees in advance. The questions falling under the general category aimed to identify primary information about UFT in each case city to supplement and build on the data obtained already from document review. Interviewees were asked about the type of products distributed, benefits and disadvantages of UFT from the local authority perspective. In the second category, the aim was to identify the existing policy goals and objectives, current or planned UFT policy measures, and other information on targets and key performance indicators. The third section asked interviewees about the policy selection process, including influences and barriers.

| Country | City | Organisation | The title of the |
|----------|------------|----------------------------------|-----------------------|
| | | | interviewee |
| SCOTLAND | Glasgow | Glasgow City Council | Technical Officer for |
| | | | Transport |
| | | Strathclyde Partnership for | Senior Transport |
| | | Transport | Planner |
| | Edinburgh | Edinburgh City Council | Senior Project |
| | | | Manager |
| | | South East of Scotland Transport | Head of Programmes |
| | | Partnership | |
| | Aberdeen | North East of Scotland Transport | Transport Strategy |
| | | Partnership | Manager |
| | | Aberdeen City Council | Senior Engineer for |
| | | | Transport Strategy |
| | Dundee | Dundee City Council | Head of Road and |
| | | | Transport |
| ENGLAND | Greater | Transport for Greater | Chief Executive |
| | Manchester | Manchester | Officer |
| | Birmingham | Birmingham City Council | Transport Officer |
| | Bristol | Bristol City Council | Strategic Projects |
| | | | Team Manager and |
| | | | Transport Planner |
| | Newcastle- | Newcastle City Council | Transport Planner |
| | Upon-Tyne | North East Freight Partnership | Senior Specialist |
| | | | Transport Planner |
| SWEDEN | Stockholm | Stockholm City Municipality | Transport Planner |
| | Gothenburg | Gothenburg City Municipality | Project Manager |
| | Malmö | Malmö City Municipality | Project Leader |

Table 3.1 Details of the public authorities and the interviewees

3.4.2 RQ2: How do supportive UFT policy measures work in conjunction with stakeholder collaboration to support successful public led UCC developments?

This study adopted a multiple case study design, in which two UCC projects comprise the units of analysis. The sample selection was based on finding a more active and a less active country in terms of managing and regulating UFT, thus one case is from Sweden (Gothenburg) and the other is from Scotland (Perth). The City of Gothenburg in Sweden has an active UCC while the UCC project in Perth was terminated just before its trial period started. It is often difficult to identify and gather data on failed cases thus the Perth case can be equally as instructive as the successful Gothenburg case. In order to enable data triangulation, two types of data were collected: secondary data (project reports, feasibility studies, news articles) and primary data (interviews). Interviews are an essential source of information in case studies, yet respondents' answers might be subject to bias, poor recall or poor articulation. Therefore, data obtained from interviews were corroborated with additional information from other sources (Yin 2014), which were obtained through web search and during the interviews.

The collection of primary data was achieved through semi-structured interviews. The identification of interviewees began with the UCC project initiators and resulted in finding the operators and users directly involved in the UCC. Finding the stakeholders for Perth's UCC was particularly challenging as the UCC was never opened and some of the stakeholders were no longer accessible. Nevertheless, in both cases the interviews have been done with the same types of respondents, from initiators, users, government and industry representatives and independent experts. This range of interviewees thus includes not just those directly involved in establishing the UCC but key representatives for providing the wider context. These actors include regional and national government representatives with responsibility for UFT, independent experts on UFT and UCCs in each country and additional industry representative. All these respondents are knowledgeable not only regarding the general UFT context in the respective city/country but also have knowledge of the respective UCC projects. Table 3.2 presents the list of interviewees, their roles within the UCC projects, their organisations and their positions. A total of 23 interviewes,
face-to-face and by telephone, were conducted between April and June 2017. The interview guide was based on the categories identified in the literature review (and used in the analysis). The interviews lasted between 30 and 90 minutes. All interviews were recorded and transcribed.

| UCC project | CC project Role within the Organisation | | | | |
|-------------|---|---------------------------------|-------------------|--|--|
| COTHENDUDC | Ducc project | | Interviewee | | |
| GOTHENBURG | Project Initiator | Local Authority | senior transport | | |
| | | Association of Peal Estate | Finance and | | |
| | | and Store Owners | Marketing | | |
| | | and Store Owners | Responsible | | |
| | Consultant | Consultancy Company | Project Manager | | |
| | UCC Operator | Local LSP | Owner | | |
| | Eirst Level | International LSD | Ducinaça Drocaça | | |
| | Customer | International LSF | Manager | | |
| | Second Level | Local Retailer 1 | Owner | | |
| | Customer | Local Patailar 2 | Owner | | |
| | | | Owner | | |
| | | Local Retailer 3 | Owner | | |
| | | Local Retailer 4 | Shop Manager | | |
| | Government | National Transport Authority | Strategic Planner | | |
| | Authorities | Regional Transport Authority | Strategic | | |
| | | | Planning Officer | | |
| | Project Partners | Research Institute | Ex Project | | |
| | with UCC | | Manager | | |
| | Initiator | | | | |
| | Expert on UFT | Academic | Senior Research | | |
| | this Country | Institution/University | Fellow | | |
| | uns Country | Linit of a Private Organisation | Project Manager | | |
| рерти | Project Initiator | Regional Transport Authority | Senior Transport | | |
| FLNIII | | Regional Transport Autionty | Planner | | |
| | Initial Supporter | Local Authority | Senior Transport | | |
| | and Partial | | Planner | | |
| | Funder | | | | |
| | Potential First | National LSP | Freight | | |
| | Level Customer | | Development | | |
| | | | Manager | | |
| | Level Customer | Local Logistics Provider | Owner | | |
| | Government | National Transport Authority | Policy Advisor | | |
| | Authorities | | | | |
| | Industry | National Industry Association | Head of Policy | | |
| | Associations | 1 | | | |
| | | National Industry Association | Business Unit | | |
| | | 2 | Director | | |
| | Expert on UFT | Academic | Professor | | |
| | and UCCs in | Institution/University | | | |
| | this country | | | | |

Table 3.2 The list of interviewees and their roles in the UCC projects

3.4.3 RQ3: How do supportive UFT policy measures affect the willingness and the perceptions of retailers in using UCCs for their last-mile deliveries?

The case study has been designed as single case study with multiple units of analysis embedded in the case. Independent retailers, which are located in various neighbourhoods of the city, composed the unit of analysis. Edinburgh is the capital city of Scotland with 524 930 habitants (Edinburgh City Council, 2019). There are a few essential elements that can be associated with the place attractiveness such as its architecture, cultural infrastructure, labour market, public services, service sector and shops (Öner, 2013). Shops create a vibrant environment for consumers and attract visitors not only from local neighbourhoods but also from other cities and towns. According to Öner (2013, p.8) "Shops are like public goods, mimicking a historical monument or a park, in terms of contributing to place attractiveness"

Edinburgh has various neighbourhoods that are catchment areas for locals as well as tourists thanks to small retailers. Edinburgh is divided to multiple city centres and town centres. The city centres are West End, High Street/Bridges, Old Town and New Town and the town centres are Corstorphine, Gorgie/Dalry, Leith & Leith Walk, Morningside/Bruntsfield, Nicolson St./Clerk St, Portobello, Stockbridge and Tollcross. It is possible to see a mix of both individual and chain stores in every single centre. Despite the domination of chain stores, there are a significant amount of independent retail stores located in the city centres and town centres. These stores have been in their current locations for many years and they are indispensable parts of the local life. Especially the town centres tend to be set within high density residential areas. This can be both a blessing and a curse for the retail shops located in these areas. It is a positive aspect because they are located next to a great demand base. However, it is a curse because the space in high density residential areas is shared by a significant number of users.

There are certain criteria for the retailers chosen for this study. First, they should be independent retailers. The main reason is that independents are more exposed to the disruptions in their deliveries which are caused by policy measures and operational issues, in comparison to chain retailers with centralised supply chains. Second, retailers should be selling non-perishable products, which do not require special handling conditions such as refrigeration. Non-perishable products include fashion (e.g., clothing and footwear), furniture, gifts, accessorises, toys and books. Under these criteria, 50 retailers were identified based on the selection criteria. These retailers are located in Stockbridge, Bruntsfield/Morningside, Tollcross, Thistle Street, Jeffrey Street, Canongate and Old Town. 30 of them accepted to participate the study and to have interviews. The common feature of these locations is that they are the parts of the city with particular retailing agglomerations and similar local transport policies are in place for all of them.

The primary data has been collected through semi-structured interviews between June 2018 and September 2018. Each interview lasted between 20 and 25 minutes. The interview guide consisted of the categories, which have been identified in the literature review (and used in the analysis) and based on the results of the previous two studies done in Scotland, England and Sweden. The following categories have been established to collect the data: (1) operational challenges experienced during the deliveries, (2) difficulties experienced due to existing local transport policies, (3) benefits and challenges of using UCCs for retailers, (4) retailers' willingness to pay for UCCs, (5) relationship with public policymakers, and (6) the impact of supportive UFT policies on the willingness of retailers to use a UCC. Table 3.3 presents the details of the independent retailers and their locations. The names of the retailers have not been disclosed due to confidentiality issues and they are given numbers between 1 to 30 as identifiers. All interviews were recorded and transcribed.

| Number of the retailer | Category | The title of the interviewee |
|------------------------|------------------------|------------------------------|
| Retailer #1 | Souvenirs | The owner of the business |
| Retailer #2 | Bookshop | The owner of the business |
| Retailer #3 | Toys | The owner of the business |
| Retailer #4 | Clothing & Accessories | The owner of the business |
| Retailer #5 | Clothing& Souvenirs | The owner of the business |
| Retailer #6 | Souvenirs | The owner of the business |
| Retailer #7 | Clothing & Accessories | The owner of the business |
| Retailer #8 | Clothing & Accessories | The owner of the business |
| Retailer #9 | Clothing & Accessories | The owner of the business |
| Retailer #10 | Souvenirs | The owner of the business |
| Retailer #11 | Souvenirs | The owner of the business |
| Retailer #12 | Furniture | The owner of the business |
| Retailer #13 | Stationery | The owner of the business |
| Retailer #14 | Clothing & Accessories | The owner of the business |
| Retailer #15 | Souvenirs | The owner of the business |
| Retailer #16 | Clothing & Accessories | The owner of the business |
| Retailer #17 | Souvenirs | The owner of the business |
| Retailer #18 | Clothing & Accessories | The owner of the business |
| Retailer #19 | Clothing & Accessories | The owner of the business |
| Retailer #20 | Skateboards & Clothing | The owner of the business |
| Retailer #21 | Souvenirs | The owner of the business |
| Retailer #22 | Souvenirs | The owner of the business |
| Retailer #23 | Clothing & Accessories | The owner of the business |
| Retailer #24 | Souvenirs | The owner of the business |
| Retailer #25 | Souvenirs | The owner of the business |
| Retailer #26 | Stationery | The owner of the business |
| Retailer #27 | Souvenirs | The owner of the business |
| Retailer #28 | Furniture | The owner of the business |
| Retailer #29 | Furniture | The owner of the business |
| Retailer #30 | Toys | The owner of the business |

Table 3.3 The independent retailers listed based on business categories and the title of the interviewees

3.5 Data collection

This section will summarise the general issues related to data collections and then it will present the tools which have been used to collect data for the thesis.

3.5.1 General issues of data collection and its methods

The next step is to formulate the method for data collection after formulating the research questions and choosing the appropriate research methodology. The method for data collection is not only influenced by the research questions but also it is influenced by the context, timing and structure of the research. Theoretical categories are recommended to guide data collection and data analysis (Yin, 2009). These categories are identified based on the previous studies as well as other data sources such as project reports, and other grey literature. In the case of this thesis, transport plans (local, regional and national) and project reports (e.g. EU-funded projects) have played a key role in determining categories for building the interview guides. On the other hand, the drawback of having theoretical categories, which are defined prior to the data collection, may force the data to fit categories.

In the case of this research, theoretical categories have been constructed prior to data collection and some more categories have emerged at the end of the data analysis process. In order to avoid the risk of fitting data according to theoretical categories, semi-structured interviews have been used for collecting the primary data. Semi-structured interviews offer researchers flexibility about the order and the content of interview questions (Bryman and Bell, 2007). Namely, researchers can ask additional questions to interviewees depending on their answers. Additional categories may emerge as a result of semi-structured interviews, which could mitigate the potential risks.

There are two different types of data: primary data and secondary data. Primary data is generated as a result of the interaction between researchers and participants. Secondary data is the type of data which have been produced by other researchers but of use in the current study. According to Yin (2009), data for case studies can come from interviews, direct observation, participant observation, documents, archival records and physical artefacts. Throughout the research process, primary data was obtained from interviews and secondary data has been collected from various

documents such as LTPs, LTSs, monitory and delivery reports (e.g. sustainable urban mobility and logistics plans), government reports, and project reports.

The data obtained from these documents have been used to understand the implementation of UFT policies, to present an initial assessment of the current situation in cities and to identify gaps in knowledge. The use of multiple sources for collecting the data enables to verify and validate the information on hand. This is called data triangulation. Triangulation is necessary to verify the primary data through obtaining information from other sources to fact-check and help to increase the validity of findings via incorporating multiple data collection tools. Semi-structured interviews have been used to collect the primary data in this thesis. In addition, desktop research plays a key role in collecting the required data to carry out with the research process. The next sections present how desktop research and interviews have been adopted as data collection tools.

3.5.2 Desktop research

Desktop research plays a key role in this research as it enables the investigation of potential gaps in the knowledge, helps to construct theoretical categories as well as help with the collection of additional data after the interviews in order to validate the findings from the interviews. Desktop research is a continuous and iterative process which can take place in any stages of the research process. In the earlier phases of this research, local transport policies, LTSs and other government reports have been reviewed in order to understand how UFT is elaborated by public authorities in the UK and in other countries. The project reports have been evaluated according to what type of UFT policies have been developed and how these policies have been implemented.

The analysis of the project reports was particularly useful in identifying UCCs in Gothenburg (Sweden) and Perth (Scotland). Data triangulation via using desktop research and interviews was assured for the first and the second studies; however, for the third study there was no other sources (e.g. annual reports, project reports) available to check the accuracy of the data collected via interviews. In order to tackle this problem, the initial contact have only been made with the shop owners, who are regarded as expert interviewees in this context. Semi-structured interviews have been designed to tackle this problem as the structure of semi-structured interviews makes more room for researchers to ask other details about topics under investigation as the conversation with participants proceeds further.

3.5.3 Interviews

Interviews are commonly used as an instrument to collect qualitative data in business research (Bryman, 2016). Semi-structured interviews have been used to collect the primary data in all three studies (presented in Chapter 4,5 & 6). The details of the interviews such as the choice of the interviewees, number of the interviews, the organisations that the interviewees come from and the job titles of the interviewees have been presented with respect to each individual study earlier in this chapter. This section will only address the choice of using interviews for data collections and will discuss the strengths and weaknesses of this particular tool.

The interviews have been designed as semi-structured interviews as they offer a certain degree of flexibility to researchers. Semi- structured interviews evolve as research progresses and enable researchers to include new emerging themes while conducting interviews, even though interviewers will have some established questions for investigation (Bryman, 2016). Regardless of the type of the interview method, researchers need to prepare an interview guide prior to initial contacts with the participants. Interview guides help researchers in carrying out data collection during interviews in a structured way and it increases reliability in case other researchers would want to investigate the same phenomena via using the same questions. The interview guide is also an important part of case study design to ensure rigour and reliability of case study research as it enables traceability. The interview guide should involve necessary information that will help researchers to know what to ask about, in what sequence, and how to pose questions and follow-ups during the interviews. In addition, a brief overview about the research topic and content of questions should be added to inform potential participants about details of research projects.

68 interviews have been completed with 69 participants. The majority of the interviews (58) have been made face-to-face and ten interviews have been made on the phone. A field trip to Sweden was organised to investigate the UCC in Gothenburg and the interviews and observations have been completed in place. Initial contacts

with the participants were made by email. The research topic and the procedure of the interviews were carried out according to the ethical procedures and guidelines set out by Edinburgh Napier University. The majority of the interviewees asked for the interview questions (presented in Appendices B, C and D) in advance. Once the participant accepted to participate in the interview, a suitable date and time were set up to conduct the interview. If the interview was being held face-to-face, the choice of location was left to the interviewee. All interviewees have been assured that their responses would remain anonymous. Anonymity offers participants a comfortable atmosphere to answer interview questions openly and provide accurate answers. This is an important point in order to avoid respondent's bias. As Yin (2009) pointed out participants may have the tendency to give answers that they think the interviewer want to hear. In the beginning of each interview, the consent of the interviewee has been obtained to record the conversation.

Qualitative case studies deal with significant amount of data as the aim is to provide a rich and thick descriptions of the phenomena which are being studied. Eisenhardt (1989) argues that one can try to capture everything when developing their theories. These theories may be rich in detail but might be lacking the simplicity of overall perspective. In this thesis, theoretical categories have been developed to provide a structure for the interview guides and the same categories have been used in order to produce meaningful results. The theoretical categories helped theory building by providing a frame for a clear presentation of the overall findings. Table 3.4 presents the theoretical categories used in each study and the sources, which the categories are drawn from.

| Case study | Category | Source |
|--|---|---|
| Case studies with local authorities (11 cases) | Policy context and governance dynamics | Sidney, 2006; Howlett, 2014; Marsden and |
| | - Collaboration between governance scales | Reardon, 2017; Lindholm and Behrends, 2012; |
| | and within departments | Lindholm, 2013; Lindholm and Blinge, 2014; |
| | - Land use planning | Rose et al., 2016; Fossheim and Andersen, |
| | - Role of non-freight policies | 2017; Kiba-Janiak, 2017; Shoemaker et al., |
| | Resource availability | 2010; Marsden and Groer, 2016; OECD, 2003; |
| | - Financial resources | Browne et al., 2005; Quak, 2015; |
| | - Dedicated UFT personnel | |
| | - Project participation | |
| | Legitimacy | |
| | - Relationships with businesses and | |
| | operators | |
| | - Public acceptability | |
| Case studies on the urban consolidation | Challenges | Browne et al. 2005; Allen et al. 2014; Kin et al. |
| centres from Scotland and Sweden (2 cases) | - Financial viability | 2017; Johansson and Björklund 2017; Lagorio, |
| | - Operations | Pinto, and Golini 2016 |
| | - Lack of collaboration | |
| | - Lack of political support | |
| | - Location and infrastructure | |
| | Stakeholder collaboration factors | van Duin et al. 2018 |
| | - Need for public action | |
| | - Awareness of barriers | |
| | - Build on large players | |
| | - Empower small players | |
| | Service offerings | Browne, Allen and Leonardi 2011; Paddeu |
| | - Electric vehicles | 2017; Johansson and Björklund 2017; |
| | - Additional stockholding | |

Table 3.4 Pre-defined categories and the sources

| | - Pre-retailing services | Björklund, Abrahamsson, and Johansson 2017; |
|--|--|--|
| | - Waste management & recycling | Gammelgaard, Andersen, and Figueroa 2017 |
| | - E-commerce services | |
| | - Using vehicles as the venue for | |
| | advertisement | |
| | - Information system enabling tracking and | |
| | tracing | |
| | - Customised delivery times and dates | |
| | Supportive policies in place | Panero, Shin, and Lopez 2011; Lebeau et al. |
| | - Financial support | 2017; Björklund and Johansson, 2017 |
| | o Start-up | |
| | o Structural | |
| | o Indirect | |
| | - Direct regulatory support | |
| | o A compulsory UCC | |
| | o License granted to transporters | |
| | o Favourable measures to UCC | |
| | operator (including out-of-hour | |
| | deliveries) | |
| | - Indirect regulatory support | |
| | o Time windows | |
| | o Weight restrictions | |
| | o Size restrictions | |
| | o EURO vehicle norms | |
| | o Age of the vehicles | |
| | o Urban toll | |
| Case study in Edinburgh with 30 retailers (A | Operational challenges experienced during the | Cui et al., 2015; Marcucci and Danielis, 2008; |
| single case) | deliveries | Paddeu, 2017; Marcucci and Gatta, 2017 |
| | Difficulties experienced due to existing local | Quak and de Koster, 2007; Browne and |
| | transport policies | Gomes, 2011; Stathopoulos et al., 2012; |
| | | 1 |

| | Daunfeldt et al., 2013; Ville et al., 2013; |
|--|---|
| | Koutoulas et al., 2017 |
| Benefits and challenges of using UCCs for | Allen et al., 2012; Allen et al., 2014; Paddeu, |
| retailers | 2017; Björklund and Johansson, 2017; |
| | Marcucci and Danielis, 2008 |
| Retailers' willingness to pay for UCCs | Marcucci and Danielis, 2008, dell 'Olio et al., |
| | 2017; Marcucci and Gatta, 2017 |
| Relationship with public policymakers | Browne et al., 2007; May et al., 2008; |
| | Lindholm and Behrends, 2012; Lindholm, |
| | 2013; Lindholm and Blinge, 2014; Kiba- |
| | Janiak, 2017; Fossheim and Andersen, 2017 |
| The impact of supportive UFT policies on the | Marcucci and Danielis, 2008; Panero, Shin, |
| willingness of retailers to use a UCC | and Lopez 2011; Ville et al., 2013; Lebeau et |
| | al. 2017; Björklund and Johansson, 2017; dell' |
| | Olio et al., 2017; Marcucci and Gatta, 2017 |

3.6 Data analysis and interpretation

According to Yin (2014) the analysis phase is the least developed stage of case study approach. Another obstacle about the qualitative data analysis is the matter of objectivity. Due to the nature of the qualitative research, data analysis is a partially subjective process as researcher(s) define the concept and decide how they will process the data to draw certain conclusions and inferences (Yin, 2014). The process of analysing qualitative data is an intense and time-consuming process and the analysis of the vast amount of data is a significant task to complete for researchers. It makes data analysis one of the most challenging parts of the research design process.

The analysis of the data in this study began with the transcription of the interviews. The transcription of interviews is a costly process as it requires significant amount of time, ensuring suitable physical conditions and human resources (Britten, 1995). The process of transcription is time consuming as for every hour of recorded interview, six times more time was spent to complete the transcriptions. All interviews have been transcribed by the author of this thesis. Working on the transcriptions is an interpretive process (Kvale and Brinkmann, 2009). It is also a repetitive process, during the analysis of the data, the records have been revisited repeatedly in order to have a better understanding of how a particular situation has been described by the interviewee.

Following the guidance of da Mota Pedrosa et al. (2012), the analysis of the data has been completed in multiple stages. The first step was coding both primary and secondary data based on the literature categories that formed the basis of the analysis (different categories for each of the three research questions). Coded data were then compared to see the similarities and differences across each case study and then integrated with the theoretical categories. Integration and iteration were executed in parallel because it was necessary to go back and forth between the data and theoretical categories to verify the validity of identified categories. The information gathered through document review was used to confirm statements made by the interviewees, ensuring triangulation of data sources. An analytical matrix has been used to collate data against each of these categories, which was then summarised for presenting the results.

Refutation was the last stage of the data analysis and was where the secondary data became particularly important. This meant that when analysing the primary data, it was occasionally necessary to contact the interviewees to clarify and verify some of the information. In addition, the initial results of the first two studies were presented at conferences for further discussion with experts in the area. Data saturation was achieved when no further gaps remained, and sufficient data had been obtained for each case against each of the conceptual categories.

3.7 Credibility and quality of research design

Reliability refers to replicability of a study's findings. The goal is to minimise errors and bias in a research study (Yin, 2003). Reliability searches for an answer to the question of if a research project is repeated, would it be possible to obtain the same results as researchers have obtained in the first place. The emphasis should be on doing the same case all over again. Reliability originates from quantitative and natural sciences. On the other hand, replication issue in qualitative research has been criticised from different angles. According to constructivist epistemology, replicability is an artificial goal to aim as there is not only a single reality to be captured. It would be unrealistic to judge the credibility of a work by only seeking for complete replication without considering unique features originated from its nature and its context (Ritchie et al., 2014). Seale (1999) argued that the reliability problem in qualitative studies can be tackled by adopting a transparent stepwise approach that aims to make a clear presentation of procedures to the audience of a research study.

These procedures should make sure that they will lead researchers and/or audiences to a particular set of conclusions. In qualitative studies, reliability criteria can be applied by ensuring features of raw data that will make the data consistent and replicable. Researchers need to be confident that elements and factors found in raw data would recur outside the study population. This can be done by documenting the procedures followed in the earlier case (Yin, 2003). In this study, reliability has been ensured by presenting the case study protocols individually for all case studies carried out in three distinctive sections (Chapter 4, 5 & 6), which defines research questions, choice of cases, and definition of the unit of analysis. These three contents of the protocol will enable the researcher to describe the required features of raw data clearly.

Second, validity refers to the extent to which findings are well-founded and reflects the phenomena that are under investigation. Yin's (2003) measures of validity are widely acknowledged among researchers that adopt case studies as a methodology. These measures argue that construct validity and external validity should be ensured for a qualified case study design. Researchers that adopt a case study approach have been criticised about lack of providing sufficiently operational set of measures and therefore subjective judgments may be involved in data collection. In order to avoid it, Yin (2003) proposed to use multiple sources of evidence, establishment of chain of evidence and involve interviewees in reviewing the case study report to avoid potential biases and misinterpretations.

In this study, both interviews and the materials identified as a result of desktop research. Government documents, LTPs, LTSs, NTSs, RTSs, Sustainable Urban Mobility Plans (SUMP) and Sustainable Urban Logistics Plans (SULP) have been used to collect data. The data collected from various sources will help each other to fill potential gaps and validate accuracy of the data. Also, the interviewees have been sent the transcriptions to control and validate the content. Next, external validity concerns the generalisability of findings beyond the investigated case study. Generalisability is connected to case study sampling and enfolding literature. Theoretical sampling is used widely in qualitative case study approach. In this approach, cases are chosen by considering their potential contributions to theory and appropriate population of cases helps to define the limits for generalisability of findings (Eisenhardt, 1989).

The risk of bias is a concern in qualitative research. Bias takes different forms such as procedural bias, researcher bias and response bias. In this thesis, certain procedures have been followed to avoid results being biased. Procedural bias can occur if a study is carried out in a way that procedures would affect results. One way to limit this is by giving the interviewees the interview questions in advance. The aim was to give the interviewees the sufficient amount of time to evaluate the questions and ask their own questions if any. Researcher bias may occur if responses are subconsciously influenced by researchers; also, researchers can be biased if they interpret data to support their hypothesis. It is a challenging task to avoid the bias that may occur in the analysis of qualitative data. In order to make an objective analysis, the data collected through the interviews have been evaluated based on the concepts identified based on the literature. The analysis has been also based on several sources of information. Response bias can occur when participants do not give genuine answers; for example, they may give answers which they believe to be expected or they may give a predetermined answer because they are concerned about what will be done with the results of the research. For instance, in the third part of the study, which was completed with the retailers in Edinburgh, the retailers might have been biased towards some policy measures in accordance with their perceptions. One method to guard against this problem is to ask respondents to explain their views and give examples as well as discuss their general issues and views of UFT in order to provide more context for the responses.

Theoretical sampling has been used to choose the cases for this thesis. For the first research question, the case cities present a diverse sample of local authorities from a population that adopts urban freight policies and shows maturity in regulating UFT in varying degrees. The diverse sample of the case studies help to enhance the generalisability of policy recommendations in the context of other local authorities. For the second research question, only two cases were chosen: UCC studies in Gothenburg and Perth. However, the findings from the analysis of two UCCs contribute to the theory extensively by presenting not only the type of supporting policy measures that enables successful implementation of UCC projects but also other factors (e.g., stakeholder collaboration), which enables the implementation of supporting policy measures. The number of the cases in the third study is limited to a single case study (The Edinburgh City); however, generalisability has been ensured through the extensive number of data sources (30 independent retailers). Enfolding literature is another aspect that is concerned with the generalisability issue. Researchers can compare results from case studies to other studies to ensure generalisability of findings. Also, results may be compared to conflicting studies, which allows raising theoretical level and sharpening construct definitions (Eisenhardt, 1989).

The quality of case study research strongly depends on the rigour of the entire research process. According to da Mota Pedrosa et al. (2012) rigourous research

should take into account particular issues such as transferability, traceability and truth value.

| Criterion | Information required to address the criterion | How it is addressed in this research |
|-----------------|--|---|
| Transferability | Theoretical aim of the study | Elaborate the previous theoretical discussion on the use of UFT policies by investigating |
| | | the phenomenon through real-life cases. |
| | Unit of analysis | The unit of analysis: |
| | | - 11 cities from Scotland, England and Sweden |
| | | - Two UCC cases: Gothenburg and Perth |
| | | - One city: Edinburgh |
| | Justification of case selection | Selection criteria were described in the methodology. |
| | (selection criteria) | |
| | Number of cases used in study | All cases described in detail. |
| Traceability | Justification of informant selection | Aimed to identify all directly involved stakeholders relating to UFT policy and UCCs in |
| | | the case cities. More informants per case used in the studies with fewer cases aiming at |
| | | close analysis (chapter 5 and 6) than in the part with several cases aiming at a simpler |
| | | cross-case analysis (chapter 4). |
| | Number of informants | 69 respondents participated the interviews |
| | Description and/or inclusion of the | The interview guide has been described in detail. |
| | data collection guideline | |
| | Description of changes in the | Interaction between primary and secondary data requiring additional contact with |
| | research design made during the | interviewees for clarification. |
| | data collection process | |

Table 3.5 Quality criteria and indicators for case study research based on da Mota Pedrosa et al. (2012)

| | Description of the data collection | The primary data was collected through 68 semi-structured interviews. Secondary data | | | | | | | | |
|-------------|-------------------------------------|--|--|--|--|--|--|--|--|--|
| | techniques | through feasibility studies, government and industry reports. | | | | | | | | |
| Truth value | Description of the data analysis | Coding and comparing against the theoretical categories (see Table 3.4). | | | | | | | | |
| | process | | | | | | | | | |
| | Categorisation identifies relevant | Categories developed using previous studies, LTPs, and LTSs. | | | | | | | | |
| | data used to build evidence for | | | | | | | | | |
| | each theme or topic | | | | | | | | | |
| | Comparison across groups and | • Study 1 and Study 2: Cases compared to identify emerging patterns from the data and | | | | | | | | |
| | identification of patterns | cross case analysis have been presented as a result | | | | | | | | |
| | | • Study 3: Data obtained from the interviews with the retailers have been compared to | | | | | | | | |
| | | identify emerging patterns; however, this study does not make a cross-case | | | | | | | | |
| | | comparison. It aims to present emerging concepts from the data. | | | | | | | | |
| | Integration develops relationships | The findings from the raw data incorporated with the theoretical categories and the | | | | | | | | |
| | between concepts | arguments have been supported with the interviewee's quotations. | | | | | | | | |
| | Iteration refers to moving back | Moved between raw data and the theoretical categories multiple times to provide a | | | | | | | | |
| | and forth between data and | completed analysis and ensure data saturation. | | | | | | | | |
| | analysis to verify the categories | | | | | | | | | |
| | Refutation refers to the discussion | • Information obtained from secondary sources validated by the interviewees. | | | | | | | | |
| | with interviewees and colleagues, | Additional contacts have been made with the interviewees to verify and clarify issues. | | | | | | | | |
| | test rival hypotheses | • The initial categories and emerging concepts have been discussed with colleagues and | | | | | | | | |
| | | initial findings have been discussed with experts when presenting at conferences and | | | | | | | | |
| | | school seminars. | | | | | | | | |

Namely, the research process beginning from the formulation of problems to the dissemination of results should be accountable and traceable by readers. Table 3.5 presents the list of criteria used to ensure research rigour in this research, based on the framework presented by da Mota Pedrosa et al. (2012). As shown in the Table 3.5., transferability was ensured by deriving a clear theoretical aim from the literature review, justification of the case study method and case selection in the preceding paragraphs and identifying and describing the design of the case studies and the choice of the units of analysis. This would enable future researchers to apply the findings elsewhere because it enables a clear comparison between theoretical positions or the units of analysis. Traceability was ensured by documenting the research process and the data sources. The selection of informants and data collection techniques were all described in detail, which can enable the reproducibility of the research process by other researchers. The last criterion is the truth value, which was ensured by describing the data analysis process in detail, particularly the coding, categorisation, interpretation and refutation.

3.8 Ethical considerations

Ethics in research process requires researchers' responsibility towards the participants in the study and responsibility towards data collection and presentation. Ethics are elaborated under four main principles; they are harm-to-participant, lack of informed consent, invasion of privacy and deception. Harm-to-participants are related to number of facets such a physical harm, causing loss of self-esteem, causing stress and reprehensible acts (Bryman, 2016). Harm-to-participant is also raised as an issue by advocating the maintenance of confidentiality of records. Data collection and the analysis of data for this research have been carried out according to the ethical procedures and guidelines set out by Edinburgh Napier University.

Confidentiality issue raises particular difficulties for qualitative research because it is a challenging task to make records anonymous and to report findings in a way that identification of participants can remain hidden. After making the initial contacts with the interviewees, their written consents have been received through emails. In order to avoid any unforeseeable ethical eventualities, in this study it has been decided to keep the identities of the participants confidential. The Edinburgh Napier University Research Data Policy requires researchers to use University approved systems for storing all research data. A dedicated drive is offered to all PhD students. The data obtained from the interviews is being kept in the dedicated drive. The data is password protected and can be accessed only by the principal investigator of this research. The second principle is lack of informed consent, which is related to the researchers' responsibility towards the participants in the study. Researchers are obliged to explain certain details of their research to participants such as aim of their research, responsible individuals or organisations that undertake the research, reasons of studying the topic, and how results will be used and disseminated (Bryman, 2016). In this research, the interviewees have been informed during initial contacts as well as during interviews about the topic of the study, responsible parties of the study and dissemination of results. Communicating these issues will enable the participants to make informed decisions about their contribution to the study (Monios, 2013).

Invasion of privacy is the third principle discussed in the context of research ethics. Privacy is strongly linked to issues of anonymity and confidentiality in the research process. Bryman (2016) argued that personal information concerning research participants should be kept confidential. The privacy issue is also linked to informed consent. It will provide detailed understanding about roles of the participants and what this participation entails. Also, informed consent shows the participants that their right to privacy is surrounded for limited domain of the research. However, participants do not revoke the right to privacy entirely by providing the consent. Still participants can refuse answering certain questions because they may think that those questions pose a threat to their privacy. None of the interviewees refused to answer the interview questions. In general, all interviews have been conducted in a comfortable environment. Deception is the last principle elaborated in ethics. It occurs when a researcher represents his work to participants differently than it actually is. Deception is mostly encountered in experimental research. On the other hand, it can become an issue in social research when researchers do not inform the participants about the purpose of the interview or the purpose of their research. In this study, deception is avoided by providing an interview guide to participants explaining the purpose of the research and the type of information that the researcher is looking for.

CHAPTER 4 : URBAN FREIGHT TRANSPORT IN LOCAL AUTHORITIES

4.1 Introduction

This chapter presents the research results from the interviews conducted with policy planners in the local authorities in 11 cities from Scotland, England and Sweden. The aim of this chapter is to investigate the process of policymaking in local authorities. The analysis was comprised of multiple facets of policymaking in the context of UFT

The chapter is structed as follows: The case data in Section 4.2 establishes the differences on the country level in terms of their actual choices of the policy measures. Section 4.2 also presents the data on the policy targets in place, and the policy and strategy documents published by the public authorities. Section 4.3 summarises the data collected in terms of governance structure, policy documents and the identified policy goals and measures in each city. Section 4.4 presents the findings of the cross-case analysis according to the analytical framework, based on the results of the interviews exploring how and why these choices came about. Finally, the chapter concludes by summarizing the findings of this study.

4.2 Overview of the countries

It is important to note that Scotland and England will be treated as two separate countries in the context of this study. The UK has a devolved system of government, whereby transport responsibilities are managed at the devolved rather than UK level, being England and Wales, Scotland and Northern Ireland. The Department for Transport (DfT) is responsible for transport in England and partly in Wales, while Transport Scotland is the main transport authority in Scotland. There are some differences between Scotland and England at the level of local authorities; in England, local authorities publish LTPs whereas in Scotland they publish LTSs.

Transport Scotland published the latest National Transport Strategy (NTS) in early 2016, with stated goals of providing accessible, safe, integrated and reliable transport with respect to economic growth, social inclusion and sustainability. The key aims of the NTS are to improve journey times and connections, reduce emissions, improve quality, accessibility and affordability in transport (NTS, 2016). The NTS is supported by other national transport plans and policies, which also involves freight related issues, such as Clean Air for Scotland (2015) and Freight Action Plan (2006). Regional Transport Partnerships (RTPs) and local authorities in Scotland also publish their own documents (RTS and LTSs, respectively) in line with the NTS and other policy documents. The NTS has a limited coverage on UFT. Transport Scotland focus on UFT through an advisory group, which is called the Scottish Freight and Logistics Advisory Group (ScotFLAG). The advisory board provides the partnership between government and business established at the national level. There are 32 LAs in Scotland and 7 RTPs, however the RTPs only provide guidance and support – actual transport policy is set either at national or local level.

In England, the DfT covers national transport goals through the Department for Transport Single Departmental Plan (2017), which focuses on economic growth, improving journey times, and providing safe, secure and sustainable transport. This document does not include indications for freight issues. Some UFT-specific guides published by the DfT include Local Authority Freight Management Guide (2007), Delivering a Sustainable Transport System: The Logistics Perspective (2008). Another document, Creating Growth, Cutting Carbon: Making Sustainable Local Transport Happen (2011), is not specifically related to UFT but outlines the government's goals to create economic growth in the UK and to address climate change through cutting carbon emission caused by transport activities, which is in line with the EU objectives, and some of the reforms there such as the government's plans to devolve the responsibility for local transport fully to local authorities, which was done later through the Localism Act 2011, also impact on planning for UFT.

As with Scotland, UFT is managed at the local level. There are 353 local authorities in England, which are made of five different types. They are county councils, district councils, unitary authorities, metropolitan districts and London boroughs. This study focuses on three metropolitan districts (Greater Manchester, Newcastle and Birmingham) and a unitary authority (Bristol). In addition, combined

authorities started to be established since 2011 as a new form of local governance. Combined authorities are established by two or more cities.

Sweden has various transport agencies, which are concerned with the transport system in the country. The Swedish Transport Agency (Transport Styrelsen) and The Swedish Transport Administration (Trafikverket) are two agencies that deal with road transport in addition to the other transport modes. Transport Styrelsen is responsible for preparing regulations while Trafikverket is responsible for making long-term planning for all transport systems and for building, operating and maintaining public roads and railways in the country. The NTS focuses on providing accessibility, high quality, security, safety and environmentally responsible transport systems. Sweden consists of 21 regions and 290 municipalities. Both regional authorities and local authorities obtain responsibilities to build efficient transport systems across their boundaries. Similar to the approaches in Scotland and England, municipalities are responsible for regulating and organizing UFT activities. Swedish municipalities work together with regional authorities and national authorities for developing or executing UFT projects. Trafikverket has a particular interest in understanding freight transport related activities at not just the national level but also in urban and regional contexts. Unlike the national authorities in England or Scotland, Trafikverket has been involved in urban freight projects together with multiple actors. The projects focus on construction logistics at the urban scale and by-pass logistics activities across cities and regions (see the projects: CIVIC and By-pass Logistics). The key data for the case cities has been presented in Table 4.1.

4.2.1 Policy and strategy documents in the countries

In England and Scotland, the city councils and the combined authorities publish documents that set out their plans and strategies for transport for each five-year period. A similar approach is followed in Sweden where city councils produce traffic strategies. All these documents have similar motivations such as outlining their baselines concerning transport, public health and safety and air quality, setting achievable objectives and plans for showing how these objectives will be achieved.

Similar to the national level, local authorities publish a variety of documents. Some of the case cities publish documents that elaborate UFT goals and measures separately such as The Stockholm Freight Plan 2014-2017 (2015), Greater Manchester Freight and Logistics Strategy (2016), SULP for Dundee (2014), Godstrafikprogram för Malmö (2014). Similarly, some publish related documents such as air quality action plans and local and regional development strategies. These documents outline goals and implementation plans for other issues that have some impact on UFT and thus have some link to specific UFT measures that are later implemented, but not elaborated specifically in these documents. Thus, specific UFT policy goals and specific measured objectives are less common than those for general transport or other environmental priorities. Indeed, often UFT measures are not included in policy documents but simply implemented and hence were identified and discussed in the interviews

| Country | Sweden | | | England | | | | Scotland | | | | | |
|-----------------|--------------|--------------------|--------------|--------------|--------------|--------------|--------------|--------------------|--------------|--------------|--------------|--|--|
| Criteria | | | | | | | | | | | | | |
| Population | 10,348,730 | | | 56,287,000 | | | | 5,463,300 | | | | | |
| National | Trafikver | rket and Transport | styrelsen | | Department f | or Transport | | Transport Scotland | | | | | |
| transport | | | | | | | | | | | | | |
| authority | | | | | | | | | | | | | |
| Number of | | 290 | | | 35 | 3 | | 32 | | | | | |
| local | | | | | | | | | | | | | |
| authorities | | | | | | | | | | | | | |
| City | Stockholm | Gothenburg | Malmö | Bristol | Birmingham | Greater | Newcastle- | Aberdeen | Dundee | Glasgow | Edinburgh | | |
| | | | | | | Manchester | upon-Tyne | | | | | | |
| Population | 974,073 | 579,281 | 344,166 | 463,400 | 1, 141 400 | 2, 780, 000 | 302,820 | 228,670 | 149,320 | 633,120 | 524,930 | | |
| | (County: | (Country: | (County: | | | | | | | | | | |
| | 2,377,081) | 1,725,881) | 1,377,827) | | | | | | | | | | |
| Types of the | Municipality | Municipality | Municipality | City council | City council | Combined | City council | City council | City council | City council | City council | | |
| local authority | | | | | | authority | | | | | | | |
| Dedicated | Yes | Yes | Yes | No | No | Yes | No | No | No | No | No | | |
| UFT personnel | | | | | | | | | | | | | |

Table 4.1 Basic information of the cities

The contents of these local documents are nonetheless influenced by national goals and objectives (see previous section), which are themselves influenced by the EU's transport policies with respect to air quality, road safety, mobility, and sustainability. Reducing the level of emission is one of the areas that the EU focuses on concerning freight transport, including a target to reduce the level of emission from transport by 80% by 2050 in comparison to 1990 levels (European Commission, 2018). All three countries set very similar targets to the EU targets when setting their individual objectives (NTS, 2016; 2050 Pathways, 2013). In England and Scotland, national governments put a heavy emphasis on air quality action plans which is then replicated at the local level. In Sweden, the EU's impact can be observed more heavily than in the UK with respect to the identified policy measures and the involvement in EU projects. For instance, the Swedish case cities were the first ones to introduce LEZs (Miljözoner), while the case cities in England and Scotland will start to implement LEZs by 2019 onwards. Second, the number of EU projects per city, which focus on UFT, is higher in the Swedish cities than the case cities in England and Scotland.

4.2.2 Policy targets in the countries

Certain key performance indicators (KPIs) related to transport activities do appear in various documents such as local transport plans and strategies, air quality action plans and environmental strategies. They are usually in the form of percentages they would like to achieve relating to certain goals such as reducing emission, reducing congestion or decreasing the number of road casualties. The targets developed by each city are listed in Table 4.2. The levels of pollutants (CO₂, NO_x, PM_{2,5/10}), road casualties, level of congestion, traffic counts, growth of general freight, growth of freight through harbours (where relevant), growth of freight through airports, journey time reliability, CO₂ emissions from council transport and number of cyclists are the KPIs that local and regional authorities mentioned in relation to freight traffic and general traffic. Most of these KPIs (except growth rates) are related to general traffic and in the majority of the cities they are not measured specifically for freight. Only Stockholm measures emission levels specifically considering freight vehicles and Gothenburg counts the number of freight vehicles travelling in the city centre.

| Table 4.2 The | targets | identified | by | the | cities |
|---------------|---------|------------|----|-----|--------|
| | 0 | | ~ | | |

| Key targets per city | | | Sweden | | | E | ngland | Scotland | | | | |
|----------------------|--|-----------|------------|-------|---------|------------|-----------------------|-----------|----------|--------|---------|-----------|
| | | Stockholm | Gothenburg | Malmö | Bristol | Birmingham | Greater Manchester | Newcastle | Aberdeen | Dundee | Glasgow | Edinburgh |
| ty | Road casualties | х | х | х | х | | х | х | х | х | х | х |
| Safe | Feeling of safety concerning heavy traffic among public | | | х | | | | | | | | |
| t | CO_2 | х | х | Х | Х | Х | Х | х | х | Х | Х | Х |
| nen | PM _{2.5/10} | х | х | х | х | Х | х | х | х | х | х | Х |
| ron | NO _x | х | х | х | Х | Х | Х | х | х | х | Х | Х |
| Envi | Percentage of HGVs not fulfilling the requirements of environmental zone | | | x | | | | | | | | |
| | Total vehicle count | | х | | х | | | х | | х | х | Х |
| | Total number of HGVs | Х | | | | | | | | | | |
| | Number of HGVs on identified streets | | | Х | | | | | | | | |
| | Level of through traffic | х | | | | | | | | | | |
| ic. | Total distance driven by car or truck in peak hours | х | | | | | | | | | | |
| raff | Modal split | | | | х | | | | | | | |
| Ĥ | Number of cyclists and pedestrians | | | | х | | | | | | | |
| ty | Journey times | | | | Х | Х | | х | | | | |
| uali | Congestion | | х | | | | Х | | х | | | |
| 0 | Level of accessibility on roads and streets by businesses | х | | | | | | | | | | |
| r | Percentage of road network maintenance | | | | | | | | | | | х |
| Othe | Number of companies within logistics industry | | | х | | | | | | | | |

4.2.3 Policy measures in the countries

The type of policy measures chosen varies based on the level of progress that each case city shows with regard to including UFT in their transport planning. According to the five categories of UFT policy measures defined by Kiba-Janiak (2017) (infrastructure, land use management, access conditions, innovation & ideas, ecological freight transport practices), it is clear from Table 4.3^{*} that access conditions are the most common types of policies among the case cities. Size restrictions, time window restrictions, designated LUBs, limited traffic zones and LEZs are in this category. Innovation-driven policies and ecological freight practices are the least common types of policies. Land use management in the context of UFT can relate to the allocation of a piece of land for UFT operations or relocation of freight generating activities, the only example of which was the attention to dedicated loading bays, which was common across many cities.

^{*} Note: p refers to policy measures currently planned

| | | | Sweden | | | England | | | | Scotland | | | |
|---------------------|--|-----------|------------|-------|---------|------------|-----------------------|-----------|----------|----------|---------|-----------|--|
| Category | Policy measure | Stockholm | Gothenburg | Malmö | Bristol | Birmingham | Greater Manchester | Newcastle | Aberdeen | Dundee | Glasgow | Edinburgh | |
| Access conditions | Time window restrictions | х | Х | х | Х | Х | Х | х | X | Х | Х | Х | |
| | Loading/parking restrictions | | | | Х | Х | Х | х | х | х | Х | Х | |
| | Size restrictions (including width, length, height) | х | | х | Х | Х | Х | х | х | х | | | |
| | Weight restrictions | х | Х | х | Х | Х | | х | х | х | Х | Х | |
| | Congestion charge | х | Х | | | | | | | | | | |
| | Low emission zone (aka clean air zones, environmental zones) | x | X | х | | р | р | | р | р | р | р | |
| | Walking speed limit zone | | Х | | | | | | | | | | |
| | Allow out-of-hour deliveries | р | | | | | | | | | | Х | |
| Ecological freight | Air Quality Management Area | | | | Х | х | Х | х | х | х | Х | Х | |
| transport | Driver training | | | | | | | х | | | | | |
| | Vehicle recognition schemes | | | | | х | х | х | х | х | Х | X | |
| | Engine idling policy | | | | | | р | | | | | | |
| Infrastructure | Urban consolidation centres | х | Х | р | Х | | р | х | | р | | | |
| | Construction consolidation | х | | | | | | | | | | | |
| | Using public transport infrastructure for freight | р | | | | | | | р | | | | |
| | Dedicated road for freight vehicles | р | | | | | | | | | | | |
| Innovation & Ideas | Delivery service plans | | | | | р | х | | | | | | |
| | Freight route maps | | | | | | | х | х | х | | | |
| | Construction management plan | | | | Х | | | | | | | | |
| | Guidance for designing LUBs | | | | | | р | | | | | | |
| | Freight vehicle priority traffic signalling | | | | | | | | x | | | | |
| Land use management | Designated loading/ unloading bays | X | Х | X | Х | х | | x | | X | Х | X | |

Table 4.3 Policy measures implemented in the cities

4.3 Detailed review of the practices of urban freight transport in eleven cities

This section presents the data, which has been collected through the interviews with the local authorities, for each individual city. The data is presented in three categories. In the first category, an overview of the cities is presented. The overview introduces the public authorities and/or their departments, which deal with UFT policy measures and policymaking processes. This section also presents the type of goods distributed in the cities. During the interviews, the interviewees have been asked about the cities' perceptions on UFT, and the advantages and disadvantages of the UFT for the cities. The overview of the cities also includes the results from this question. The second section presents policy goals, policy objectives, and finally the policy measures of the cities. Finally, each section has a section to conclude the findings from the interviews. The conclusion sections include tables, which summarise all information that belong to a city.

4.3.1 Stockholm

4.3.1.1 Overview of the city

Stockholm is the largest municipality in Sweden. Transport administration is the department within the municipality that concerns with freight and logistics network in the city. Freight flow in Stockholm consists of consumer goods, construction materials, waste, hazardous goods, office deliveries, service deliveries and postal mail. Like many other big cities, Stockholm has multiple zones that can be considered as populated points where residential, retailing and business-related commodities are agglomerated.

Road transportation is the primary method to transport goods in last mile distribution. Food related freight is distributed to grocery stores, other food boutiques, restaurants, cafes, and bars. As a result of the development of new areas in the city, Stockholm needs to handle a substantial amount of construction material transported by heavy goods vehicles (HGV). In connection with construction operations, it was brought up that construction by-products such as soil and gravel cause to increase the number of HGVs circulating within the city as they need to ship all the by-products out of the city during development stages and they are brought back into the city during oncoming stages of development projects. Stockholm also handles freight distribution to public premises such as schools and hospitals where HGVs carry goods.

Department of Transport Administration does not keep track of the number of shipments to certain premises over the time (e.g. daily, weekly or monthly) or final destinations of goods vehicles. However, they do measurements on vehicle category as one of the results of congestion charging scheme. UFT has often discussed in the context that its negative impacts outweigh its benefits for cities. In Stockholm, freight is regarded as one of many constituents that keeps the city alive and running. It was also mentioned that efficient movement of goods includes movements of waste and hazardous materials out from the city and Stockholm can benefit from efficient transportation of wastes by providing cleaner and healthy environment for its habitants. Besides these advantages, congestion, air pollution, road safety and decreased mobility were mentioned as disadvantages that UFT cause in Stockholm.

4.3.1.2 Policy measures in place

Stockholm identified four policy goals in their "The Stockholm Freight Plan 2014-2017". These goals aim to achieve more reliable journey times, improved access to loading and unloading zones, incentivising the use of clean vehicles and advancing freight delivery partnership with other private and public stakeholders. The municipality concentrates on implementing new policies and updating the existing policies to respond to the changing trends in the city. Stockholm has the following policy measure in place; they are (1) congestion charge, (2) consolidation centres in combination with exemptions from time window restrictions (for construction, food and non-perishable commodities), (3) environmental zone (no access for vehicles lower than Euro 5 standard engines), (4) time-window restriction, (5) night ban for HGVs and (6) dedicated loading/unloading bays and (7) trials for out-of-hour deliveries.

The municipality in cooperation with other stakeholders (e.g. universities and logistics companies) started working on the existing night ban on delivery vehicles.

They started a pilot study, where they have lifted the ban between 10 pm and 6 am to make deliveries to premises. Only one vehicle has been used to do three different deliveries, and special equipment has been inserted in the truck to cancel the noise that may occur during deliveries and unloading operations. If the municipality obtains benefits in transport efficiency, they are planning to extend the trail by increasing the number of vehicles in their fleet. The municipality has two project proposals and an ongoing project to develop solutions for a better-structured UFT system and to update some of the existing studies. First, they do trials for granting freight vehicles with permissions to access to public transport's infrastructure. Second, they do a feasibility study, which is related to targeting loading/unloading bays. They are planning to develop a system that drivers can book parking spaces in advance to their journeys by using a mobile app. However, they are restricted by Swedish law which prohibits public goods (e.g., roads, kerbsides) to be reserved for particular use.

The municipality reviews existing regulations for weight and length restrictions for trucks in particular streets and neighbourhood of Stockholm. In the project, the department of traffic administration works on updating the existing legislation on size restrictions by identifying particular streets and neighbourhoods where longer and heavier freight vehicles are not allowed due to potential harms on infrastructure. The municipality is also planning to implement policy measures, which will keep cars away from the inner city. These types of measures can help municipalities to decrease the competition for shared spaces and pressure on freight vehicles.

4.3.1.3 The process of policymaking

The process of policymaking is influenced by various factors. These factors are related to habitants of cities, available resources, industrial landscape, non-freight related subjects (e.g., land use planning, pedestrianisation, etc.). In Stockholm, public acceptance steps in when the municipality implement Policy measures in plane, which increases the mobility of vulnerable road users by improving walking and cycling infrastructure as well as removing vehicles from the city centre. The interviewee mentioned, "The mobility and what we do on street level is more of an issue for public acceptance." Freight policies are not as emphasised as public transport policies or policies related to mobility. However, particular policies such as congestion charge, which will also affect individuals, need to gain public acceptance as emphasised by the interviewee.

The municipality needs to find a balance between politicians' wishes to keep freight vehicles out of the city and to protect economic prosperity obtained from UFT in Stockholm. Land-use planning is another factor that influences choice of policy in the municipality of Stockholm. The department of traffic administration realised that they need to disseminate the knowledge concerning urban freight related issues in Stockholm within transport planners as well as with other departments (e.g. city planning). Therefore, they are in preparation of a handbook, which includes the most common questions and issues. The main focus of the document is to increase freight awareness amongst other transport planners and various departments, whose decisions influence freight related decisions on local authority level.

Availability of particular resources such as financial and human resources is not one of the critical influences that affect the choice and the implementation of freight policies on a local level. On the other hand, non-freight policies have considerable influence on the selection of policies. For instance, in the pilot they use small electric vehicles that make deliveries from the consolidation centre to retail premises, which are in a pedestrianised area in the Old Town of Stockholm. There is an influence of pedestrianisation on the design of urban freight network and the type of vehicles used for goods' distribution. The main aim is to close this particular area for vehicle traffic to provide a safer and more attractive environment for pedestrians. The UCC has been added to retailer's distribution network to consolidate goods in a smaller number of vehicles and to promote the use of low emission vehicles in populated areas.

In connection with their freight policies, Stockholm measures emission, the level of congestion and number of road casualties. Collaboration is one of the key factors that drive department's learning as well as policy-making processes. They are involved in research projects where they develop trip generation models for freight to provide appropriate outputs for city planners. City planners can use this information while planning new development projects within the city. Department of traffic administration also works with freight partnerships from other Swedish cities, and they meet for knowledge exchange in a conference which is organised every second year with the participation of various private and public organisations from Sweden as well as outside of Sweden. Stockholm has a long history in participating EU-funded projects to develop urban freight related solutions within the city. They mentioned that such projects have plenty of contributions regarding increased financial resources, workforce and gaining legitimacy. Implementing policy measures in a project context, which is validated on EU level, helps these policy measures to get acknowledgement on national agenda.

4.3.1.4 Conclusion

In the case of Stockholm, there are clear links between their goals and the existing policy measures. This is mainly because the municipality has information about the status of UFT in the context of the city. In the light of the information, they can identify the problems and the issues that need to be dealt with. They can also identify freight-focused goals. These goals do not only lead them to determine the most suitable policies to be implemented but also review and modernise the existing ones. The latter is a crucial issue because local authorities need to understand altering trends in societies as well as in cities. Stockholm's municipality works towards coping up with the current trends and update their policies accordingly.

Collaboration and projects are two important indicators that show the focus of the municipality concerning freight related issue. The municipality collaborates with various freight networks to share experience and develop joint projects. The projects help the municipality to identify problems as well opportunities to make developments in the current UFT system and freight policies. The existence of a dedicated department is crucial if the municipality wants to make meaningful conclusions out of the information on hand. In this perspective, Stockholm's municipality can centralise the knowledge inside the institution and disseminate it to other departments as well.

The municipality aim to achieve environmental protection, economic growth, and to improve accessibility and mobility in the traffic. Congestion is one of the problems that Stockholm needed to focus on when increasing mobility and accessibility. The city implements congestion charge since 2006 to keep the number of vehicles entering the city centre under control. Time window restrictions in pedestrianize areas are also useful tools to restrict vehicle movement and allow other road users more mobility. The vehicles coming from the consolidation centres can travel to the pedestrianize areas to make deliveries. The UCCs help to reduce emission caused by reducing the number vehicles to the city centre and low emission vehicles are in use. The reduction in the number of vehicles also contributes to road safety. Stockholm also has LEZs, which are implemented based on the national framework. LEZs target diesel powered HGVs to become cleaner via implementing restrictions based on engine types. LEZs help the municipality in various ways when they mitigate the problems occurred due to freight movements. First, LEZs decrease air pollution as it requires freight operators to use cleaner vehicles. Second, LEZ can motivate some receivers as well as operators to join the UCCs depending on size of their operations and places that they operate.

The municipality reviews the existing policy measures including UFT related measures periodically to ensure that whether existing policies meet their goals and whether current policy measures need to be redesigned or altered completely. Stockholm started to review night bans on HGVs. Night bans are implemented to reduce the number of freight vehicles making their deliveries during night times and causing discomfort and noise pollution. However, OHD become logical to avoid entering crowded roads and streets during peak hours of the day. The municipality collaborates with freight operators and truck manufacturers to see if OHD can be accomplished with the help of vehicles with silences equipment. The trial ended in December 2016; however, they will continue to work with off peak deliveries by extending their fleet with an electric powered HGV. The new vehicle in the OHD study will be provided by an EU-funded project called ECCENTRIC, which focus on urban freight solutions and sustainable mobility in suburban districts. Table 4.4 summarises the key information about UFT in Stockholm.
| STOCKHOLM | | |
|---------------------|---|--|
| Features | Content | |
| Population | 974,073 | |
| Types of goods | Food, non-perishable consumer goods, recyclable goods, and | |
| | waste | |
| Documents | The Stockholm Freight Plan 2014-2017 | |
| involving transport | Sustainable urban mobility plan | |
| strategy and UFT | | |
| Local transport | Environmental protection | |
| goals and city- | - Reduce carbon emission and other pollutants | |
| specific aspects | - Incentive the use of low emission vehicles | |
| | Economic growth | |
| | - Collaboration with freight operators, manufacturers, and | |
| | receivers | |
| | Increased accessibility and mobility | |
| | - Improved access to loading and unloading zones | |
| | Reducing congestion | |
| Policy measures | Low emission zones: | |
| | - Euro 2 can no longer enter | |
| | - The latest a Euro 3 can be driven is 2015 (if first registered in | |
| | 2007). | |
| | - Euro 4 vehicles can be driven until 2016, regardless of the year | |
| | of registration. | |
| | - Euro 5 and EEV vehicles can be driven until 2020, regardless | |
| | of the year of registration. | |
| | Congestion charge | |
| | - Hours of operation: 06:30 - 18:29, Monday to Friday | |
| | - Stockholm city: Between SEK 11 and SEK 35 (depending on | |
| | the time of day) with the maximum daily charge per vehicle of | |
| | SEK 105 for inner city and Essingeleden together. | |
| | - Stockholm Essingeleden: Between SEK 11 to SEK 30 | |
| | (depending on the time of day). | |
| | - Exceptions: Overnight, at weekends and on public holidays or | |
| | during the month of July. | |
| | - Controlled by Automatic Number Plate Recognition system | |

Table 4.4 Stockholm Summary

| | - Surcharge: 500 SEK | |
|------------------------|--|--|
| | - The Lidingö rule: No congestion tax is paid for vehicles which | |
| | pass two separate payment stations within 30 minutes where | |
| | one of them is one of the payment stations on Gasverksvägen, | |
| | Lidingövägen or Norra Hamnvägen. | |
| | Restrictions | |
| | - Time restrictions in pedestrianised areas: Restricted hours | |
| between 10 am and 4 pm | | |
| | - Size restrictions: Including width, length, height | |
| | - Weight restrictions | |
| | Nighttime delivery ban for HGVs in combination with weight | |
| | restrictions: Freight vehicles heavier than 3,5 tonnes are not | |
| | allowed to make deliveries between 10 pm and 6 am | |
| | Urban consolidation centres in combination with time window | |
| | restrictions (UCC's vehicles are exempted) | |
| | - Types of goods handled: Construction material, food and non- | |
| | perishable consumer goods | |
| | Construction consolidation | |
| | Dedicated LUBs | |
| | Out-of-hour freight deliveries (Planned) | |
| | Fossil fuel free traffic in 2050 (In progress): The local authority | |
| | works on investigating how to implement a regulation to remove | |
| | vehicles powered by fossil fuels the until 2050 | |
| | Use of public transport for freight (Planned): Doing measurement | |
| | together with KTH | |
| | Dedicated road for freight vehicles (a.k.a. Access road – Planned): | |
| | More flexible restrictions around the access road and how can be | |
| | provided for freight vehicles. | |
| Key performance | CO ₂ emission and other pollutants (NO _x and PM ₁₀): Overall traffic | |
| indicators and | The number of HGVs | |
| targets | The level of accessibility on roads and streets by business owners: | |
| | No measurement framework available (UMS, 2012) | |
| | The level of through traffic: Less than 5% by 2030 (UMS, 2012) | |
| | Road casualties: | |
| | - By 2020, the number deaths and serious injuries will be less | |
| | than 166. | |

| | - The figure today (at the time of the research has been | |
|-------------------|---|--|
| | performed) is 277, based on an average from 2006-2009 | |
| (UMS, 2012) | | |
| | The total distance driven by car or truck on city's roads and streets | |
| | in peak hours will not exceed 2008 levels by 2030 | |
| | - No data available currently (UMS, 2012) | |
| International and | Civitas Eccentric, Prosfet, Frevue, Tellus, Sub-urban logistics, | |
| national projects | SUMPs-UP | |

4.3.2 Gothenburg

4.3.2.1 Overview of the city

Gothenburg is the second largest city in Sweden with a population of 579, 281 (the number increases to 1.7 million if entire region is considered). Regional Gothenburg spans 13 municipalities and this part only focuses on the City of Gothenburg (the municipality). The city owns one of the major harbours in Sweden and majority of the goods supplied from the harbour are destined for the other parts of Sweden or Norway, and the automotive industry is located outside of the city centre. It makes Gothenburg a logistics hub for the cities as well as countries around it. When working with UFT, the municipality only considers the goods that are coming from terminals located on the outskirts of the city and are distributed to receivers located in the inner city. The main freight flows in Gothenburg consist of retail goods (including food and non-food commodity items), deliveries to hotels, restaurants, cafes and bars, home deliveries, waste removal and service deliveries.

According to the city administration, managing UFT can help downtown shops and boutiques to compete with the other shops and the boutiques, which are located in shopping malls. A well-functioning freight network can help these retailers by enabling reliable and accurate deliveries to their promises especially in the inner city. UFT causes congestion in the inner city of Gothenburg. The municipality mentioned that emission levels do not pose a significant problem on the local roads in comparison to air quality problems on regional and national roads that are passing through the city. The main reason of why emission became a less significant problem for the city centre is that Gothenburg focuses on increasing use of zero and low emission vehicles that operate within the city.

4.3.2.2 Policy measures in place

Gothenburg implements various policy measures that directly targets freight distribution in the city such as (1) time window restrictions for HGVs, (2) weight restrictions for 3,5 tonnes vehicles (3) environmental zones, (4) congestion charging, (5) UCCs and (6) dedicated loading/unloading bays and (7) walking speed zones. They are not involved in and accreditation, certification or recognition schemes. It was

identified that Gothenburg does not find existing schemes to be applicable under current circumstances in the city; however, they work on developing their standards regarding safe and clean driving.

Gothenburg pays particular attention to consolidation programmes among other policy measures, and their aim is to increase the use of UCCs in the city. During the feasibility studies, the municipality identified that small parcel deliveries constitute the majority of the deliveries in particular areas of the city. Increasing number of pedestrianised areas is also one of the factors why the municipality chose to implement UCCs in various areas in the city. Stadsleveransen is the inner-city consolidation project in Gothenburg that serves 200 customers in the inner city of Gothenburg where an intense retail agglomeration is observed. Stadsleveransen uses electric vehicles to make freight transport, and retailers using the UCC schemes are exempted from time window restrictions in pedestrianised zones.

The second UCC serve in a smaller region where educational and corporate organisations are concentrated. Lindholmen UCC scheme serves 14 organisations and provides services such as goods receiving, distribution and waste management. Consolidation is used heavily in Gothenburg. As it is the case in Stockholm, Gothenburg is also expanding, and they are developing residential areas; as a UFT solution, they do feasibility studies to consider what type of UCCs can be built and where they should be located. The municipality base their policies on particular goals. These goals focus on creating a healthy city environment, reducing congestion and noise, and minimizing interference between goods vehicles and vulnerable road users in connection with road safety. The municipality concerns less with air quality problems within the city centre. It is the result of dedicated policies (e.g., LEZs) and their incentives for using low and zero emission vehicles on the local roads. These goals are published on the local authorities Environmental Programme, Transport Strategy and Development Strategy 2035.

The municipality of Gothenburg does performance analysis for the freight policies. They do traffic counts to observe the distribution of freight traffic throughout the city and reduce the density of freight vehicles. In order to meet their targets regarding congestion caused by freight transport, they develop additional consolidation project where it will help reduce the number of vehicles travelling in and around of hot spots of the city. However, road safety and emission measures are done on overall transportation level; they do not have particular road safety and emission targets particular to UFT. However, they aim to contribute overall targets of the city traffic by working on the freight side of traffic.

4.3.2.3 The process of policymaking

Gothenburg's municipality has a dedicated department called "Urban Transport Administration", which works with UFT policy measures. The main tasks of the department are of searching for new policies, freight flows in construction projects, choice of location for freight terminals, developing the dialogue with external stakeholders, and networking. The department employs consultants and transport planners. The municipality benefits from its collaboration with various public and private organisations to learn about urban freight solutions and develop competent solutions. Gothenburg has a freight network which brings stakeholders from public institutions including the municipality and private companies such as freight forwarders, real estate owners and retailers. Collaboration and cooperation between the municipality and other stakeholders play a key role when the municipality chooses the most convenient policy measures. Developing relationships inside and outside enable the municipality to obtain useful information such as types of freight, requirements of businesses and operators, and the projects developed by other departments, which can affect the choice of UFT policies.

There are other internal and external factors that influence the municipality's decision making. The factors such as public acceptability, relationships with businesses and operators, land-use planning policies and existing resources affect the choice of policy at the local level. Gothenburg has a long-standing tradition in terms of collaborating with the general public, businesses and freight operators. The interviewee mentioned that dialogue between stakeholders enable both parties not only to have a platform for a better dialogue but also to develop competent policies. The municipality considers the expert feedbacks from freight operators and businesses, who are particularly affected by the policies in place, as their opinions affect the choice of policies:

"It's a way we have been working for many many years because it's not just to have a better and constructed dialogue, maybe when we put an effort to have a broader dialogue, we also get better solutions and we get more input about how we can adjust and develop both suit the needs and the reach our goals"

Land use planning and freight transportation are not mentioned together frequently. However, rapid urbanization and increasing awareness on other stakeholders' existence in traffic make a land scarce resource. The Department of Urban Traffic Administration and the Department of City Planning Authority work together to communicate their priorities and requirements when a new development project has been issued. Because it is the case that particular decisions that affect freight activities and land development activities. Land use planning and freight planning collaborates in other instances such as where and what type of consolidation schemes should be developed around new development areas. Concerning resources, the municipality prioritises the most urgent and the most necessary developments when they use available resources. However, despite some urgent matters, some limitations may exist on investments that require complex and costly equipment such as automatic bollards to control the vehicle access to certain areas in the inner city.

In general, lack of resources does not pose any barriers when the municipality chooses freight policies. Interdepartmental collaboration is a key player within Gothenburg City municipality. Freight professionals in Urban Traffic Administration work on prerequisites of other departments that can influence the freight policies. They also work with national level organisations such as Swedish Transport Administration in terms of environmental zone and using public transport infrastructure for UFT within the city. Gothenburg is involved in many European and national freight networks and the municipality takes part in various EU and national projects related to UFT. POLIS and CIVITAS are two well-known networks, which Gothenburg's municipality is also involved. The municipality became a partner in UFT projects such as SMARTSET, SENDSMART, GO: SMART, OptiCITIES and Novelog. According to the municipality, these projects provide financial strength and enable the city to achieve their goals in terms of implementation, execution, and follow-up of developed measures.

4.3.2.4 Conclusion

The municipality of Gothenburg puts an emphasis on UFT in the local transport planning. The local authority focuses on three dimensions while dealing with UFT such as environment, economy and society. The dimensions are driven by particular objectives, which are stated in the local transport plan. Clean transport systems and the use of low emission vehicles are the environmental objectives. The municipality also wants to reduce the distance covered by freight traffic. This particular objective has two facets; first, the municipality wants to remove vehicles (including freight vehicles) from certain zones in the inner city. The municipality implemented weight restriction for 3,5-ton light goods vehicles (LGV) in combination with time window restrictions. Since February 2017, LGVs are not allowed to visit particular zones between 11 am and 4 pm. After the restricted hours, delivery vehicles are allowed to enter the zones, but they need to drive not faster than walking speed as there are designated walking speed areas in the same zones.

The second facet concerns with types of vehicles. The municipality aims to decrease the distance travelled by diesel- and petrol-powered vehicles. They want to incentivise low emission vehicles for good distribution in places where time restrictions, weight restrictions and pedestrianised areas exist. The municipality subsidise one of the UCC projects, which is called as Stadsleveransen. The consolidation centre has been established in cooperation with a trade association and an operator. The UCC serves a shopping district where many retailers in different sizes are located. The UCC enables the municipality to decrease the distance covered by many vehicles due to consolidation of goods in a particular truck. The truck is an electric powered vehicle, and the municipality can incentivise some of the deliveries to be carried by the electric vehicle.

The project, which the municipality support to establish the UCC, becomes a platform for various stakeholders to discuss UFT related problems and develop solutions that will meet different objectives. The municipality implements other policies which are in line with their environmental objectives such as environmental zones and congestion charge. Congestion is one of the problems in local transport. The municipality aims to keep the number of vehicles that enter the city under control, and they implement congestion charge. The municipality can also benefit from the

congestion charge by reducing emission levels as congestion charge is expected to decrease the number of vehicles travelling in the city. Gothenburg also have environmental zones (also known as LEZ). The environmental zone imposes the restrictions on HGVs that are heavier than 3,5 tonnes. The vehicles are allowed to enter the environmental zones based on their engine standards. Table 4.5 present the engine requirements based on their time spans.

The municipality designs dedicated LUBs for the freight vehicles in areas where drivers can find limited parking spaces. The municipality puts designated places for delivery vehicles in order to avoid the congestion that the delivery vehicles may cause in case they cannot find a parking space. In conclusion, Gothenburg has clear links between their transport goals and the policies that are in place. The municipality implemented existing policies according to their local goals, which focus on environmental protection, collaboration and creating attractive city centres. Each policy contributes to one or more of the local transport goals. Table 4.5 summarises the key information about UFT in Gothenburg.

| GOTHENBURG | | |
|---------------------|---|--|
| Features | Content | |
| Population | 579 281 | |
| Types of goods | Food, non-perishable consumer goods, recyclable goods, and | |
| | waste. The goods flow to/from the harbour is not included. | |
| Documents | Gothenburg 2035 Traffic Strategy for a Close-Knit City (with a | |
| involving transport | separate section for Freight Strategy) | |
| strategy and UFT | Climate Programme for Gothenburg | |
| | Various project reports and other documentation (e.g., | |
| | presentations) | |
| Local transport | Environmental protection | |
| goals and city- | - Incentive the use of low emission vehicles | |
| specific aspects | - Reduce the emission by 80% until 2030 (compared to the | |
| | numbers calculated in 2010) | |
| | Economic growth | |
| | - Collaboration with freight operators, manufacturers, and | |
| | receivers | |
| | Vibrant and attractive city centres | |
| | - Increased accessibility and mobility | |
| | - Reducing congestion and noise | |
| | Road safety | |
| | - Minimizing interference between goods vehicles and | |
| | vulnerable road users | |
| Policy measures | Low emission zones: | |
| | - Euro 2 can no longer enter. | |
| | - The latest a Euro 3 can be driven is 2015 (if first registered in | |
| | 2007). | |
| | - Euro 4 vehicles can be driven until 2016, regardless of the | |
| | year of registration. | |
| | - Euro 5 and EEV vehicles can be driven until 2020, regardless | |
| | of the year of registration. | |
| | Congestion charge: | |
| | - Hours of operation: 06:30 - 18:29, Monday to Friday | |

Table 4.5 Gothenburg Summary

| | - Gothenburg: Between 9 SEK and 22 SEK (depending on the |
|-------------------|---|
| | time of day) with the maximum daily charge per vehicle of 60 |
| | SEK |
| | - Exceptions: Overnight, at weekends and on public holidays or |
| | during the month of July. |
| | - Controlled by Automatic Number Plate Recognition system |
| | - Surcharge: 500 SEK |
| | - A single charge rule: A vehicle that passes several payment |
| | stations within 60 minutes is only taxed once with the highest |
| | amount. |
| | Time restrictions in pedestrianised areas: Restricted hours between |
| | 10 am and 4 pm |
| | Time restrictions in combination with weight restrictions: 3,5 |
| | tonnes LGVs are not allowed to make deliveries between 10 am |
| | and 4 pm on particular streets |
| | Urban consolidation centres in combination with exemptions from |
| | time window restrictions |
| | - Types of goods: Food, non-perishable consumer goods and |
| | waste collection |
| | Designated LUBs |
| | Walking speed zones: Vehicles are allowed on some streets but |
| | only can drives as fast as walking speed. |
| | Vehicle Recognition Scheme |
| | - Not applicable |
| Key performance | Congestion |
| indicators and | Total vehicle count |
| targets | Road casualties: Overall traffic |
| | CO_2 emission and other pollutants (NO _x and PM ₁₀): Overall traffic |
| International and | Novelog, Smartfreight (CTH), Prosfet (GU), Citylab (GU), |
| national projects | Opticities, Tellus, Smartset, Automated Logistics Services |
| | (Chalmers), CIVIC (Chalmers, Closer), DenCity, Sub-urban |
| | logistics, Go:smart (National), CityHush, ViajeoPLUS |

4.3.3 Malmö

4.3.3.1 Overview of the city

Malmö is the third largest city of Sweden with 344 166 inhabitants. Malmö City Council is the highest decision-making assembly of the city. The interview has been conducted with Planning Department of the city council. Food, non-food commodity items, municipal goods (both food and non-food), and waste are the primary sources of freight distribution in the city. Malmö is located in a geographically important part of the country, where it is connected to mainland Europe and brings substantial amount of transit freight flow to Malmö.

The city also has a harbour where export, import operations take place, although volumes are not as high as it used to be. The speed of urbanisation affects the development of the city and the volume of freight distributed in the city keeps increasing. According to the municipality, current size restrictions and time restrictions on HGVs caused the increase in the number of LGVs. The municipality considers UFT related operations as a contributor to the local economy by supplying various premises such as shops, schools, hospitals, restaurants and hotels. Some detrimental impacts of UFT are inevitable in Malmö such as road casualties; emissions and noise are considered as the most significant negative impacts caused by UFT in the city.

4.3.3.2 Policy measures in place

The municipality of Malmö focus on the sustainable development as the main theme in their SUMP. The municipality identified specific sub-goals in connection to the sustainable development, which relates to urban transport including freight. They aim to reduce the traffic in the city centre, to minimise negative effects on the environment, health and safety, and to contribute to economic growth by developing their transport infrastructure. The municipality concentrates on four key area, when they choose and implement policies such as (1) collaboration with other stakeholders, (2) promoting safe and efficient city logistics, (3) investing in energy efficient vehicles and (4) acquiring freight information to increase awareness on local level. LEZ, size restrictions, time-window restrictions, LUBs and night bans are the freight policies and initiatives that are in place. The municipality built the longest LUB of the city in congested medieval zones of the city. Previously, the medieval zone did not have any LUBs and the lack of LUBs increased congestion. They built LUBs in order to avoid the problems that the congestion can cause. Similar to Stockholm and Gothenburg, Malmö is not involved in any accreditation and certification programme. Consolidation is one of the implemented policy measures in Malmö. They have an active consolidation centre that is run by the municipality, located outside of the city centre, where schools are highly populated. This public-led consolidation centre makes freight deliveries to schools' premises. The main motivation behind to use a consolidation scheme in this area to keep HGVs and LGVs away from the area in order to increase road safety.

The municipality also involved in a project for a commercial consolidation centre, which is based on public-private partnership and they did a pilot study for two years. The project had two aims; first optimization of load rate in vehicles and implementation of electric vehicles to distribute goods to premises in the city centre. This freight was also exempted from time restrictions that are applicable for other freight vehicles during certain hours of day. However, the consolidation centre was closed after the project period ended because there was not enough participation from the retailers located in the city centre. Recently the municipality started a new micro consolidation project, which is in the stage of initial development. This commercial consolidation centre is going to handle the deliveries for the city centre and the municipality is the sole owner of the project at the moment.

Malmö represents a proactive profile in terms of developing and implementing local policies for UFT. However, the municipality lacks KPIs that specifically look for the performance of the freight policies in place. They defined targets but they do not observe how existing policies perform for accomplishing their transport goals. Recently the municipality defined particular performance measures and they are planning to do regular follow-ups on them. The measures are the number of heavy vehicles on identified streets, the amount of workplaces within the logistics sector in Malmö, the number of companies within the logistics sector in Malmö, the percentage of heavy vehicles not fulfilling the environmental zone regulation, the number of deaths and severe injuries caused by heavy vehicles and the feeling of safety concerning heavy traffic among public. There are no current targets in numbers for the performance measures at the moment.

4.3.3.3 The process of policymaking

Malmö only has one dedicated personnel, who is working on strategy development for UFT in addition to the other responsibilities. Learning process takes place via evaluating existing policy measures in Sweden. In this way, they learn what type of freight policy measures exist and they exchange knowledge to learn more on how particular policies can be adopted in Malmö. Their policy-making process is heavily driven by political atmosphere, where decision-makers will influence decisions about what type of freight policy should be implemented. According to the municipality, public acceptability should play an important role in terms of public's contribution in the policy-making processes on local level. However, there is no collaboration between the citizens and the municipality in Malmö concerning the implementation of freight policies. On the other hand, the municipality emphasises contribution of public-private partnership in policy-making processes. In this way, the municipality can achieve its goals by co-developing freight initiatives instead of implementing strict regulations.

Another influence on policymaking is about how land-use policies influence decision-making in UFT. The municipality has an opinion that land-use planning, and freight planning should be collaborating when it comes to new development areas where city is expanding via new housing and where new freight delivery channels will exist. In addition, the city's master plan mandates that some logistics facilities (for freight coming from outside of the city) should be concentrating around the harbour or outside the city centre. This is mainly because space is a scarce resource in city centre, and it needs to be developed as an attractive city centre and for non-freight related development projects. Lack of resources is another issue that affects the decision-making. In Malmö, the Department for Planning lacks personnel and funding that are dedicated to freight issues in the city compared to the funding that is dedicated to other transport modes.

Freight is a part of Malmö's SUMP, which combines in it as a part of traffic system in the city. SUMP requires different traffic programs such as pedestrianisation, cycling schemes and environment to work together with freight traffic program. Therefore, Malmö considers the effects of non-freight policies on freight policies. In the case of a new street development projects, UFT officers will work together with the other officers, who are responsible for planning public transport, cycling & walking and road safety. Each office will make his/her own proposal regarding how different traffic systems co-exist without intervening each other. It proves that the municipality encourages interdepartmental collaboration to discuss and solve UFT related problems or other issues that UFT may cause. The municipality also works with the municipalities in Stockholm and Gothenburg through freight networks. The municipality also works together with the national government in implementing policies and setting targets for subjects such as air quality. Malmö is also involved in both national and EU funded projects to learn and discuss about UFT policies as well as implement particular policies (e.g., SamCity-National, Smile-EU, SUMPs-UP-EU, ADVANCE-EU).

4.3.3.4 Conclusion

The local authorities in Malmö work for increasing the awareness on the importance of freight transport in local context. In comparison to Stockholm and Gothenburg, Malmö does not have an extensive number of freight policies. However, there is a link between the goals and the current policies in place. The municipality focuses on the environmental protection, and they implement environmental zones in order to control greenhouse gas emission, which also relates to public health. They implement size restrictions, which bans vehicles longer than 12 meters to enter the city centre. This restriction aims to keep rigid HGVs out of the traffic in Malmö (except outskirts of the city and harbour zone) and to ensure better road safety. The vehicles with the trailers need to park their trailers outside of the restricted zones and then they can travel to the central parts of the city.

The municipality implements night ban on HGVs between 10 pm and 6 am to avoid noise and disturbance caused by delivery vehicles. This policy can relate to mitigate negative impacts on the environment and the society. UCCs are one of the policies that the municipality use in different contexts such as public sector goods deliveries and commercial deliveries. The centre which works for school deliveries is in connection with the promotion of safe and efficient city logistics. The interviewee motivated the reason as follows: "We have a consolidation centre owned by the municipality and we try to consolidate the goods to the preschools in the area that's mostly because we want HGVs away from preschools, we use EVs and freight bicycles." Increasing the awareness of freight issues is acknowledged as a crucial issue by the local authority. In order to accomplish their goal, they initiated a program, which bases on identification of particular policy measures and collecting data for these measures. The municipality wants to obtain more information about problems caused by UFT as well as potential gaps that can be fulfilled by implementing competent policies and initiatives. Table 4.6 summarises the key information about UFT in Malmö.

| MALMÖ | |
|---------------------|---|
| Features | Content |
| Population | 344,166 |
| Types of goods | Food, non-food consumer goods, municipal goods (both food and |
| | non-food), and waste Malmö accommodates a transit freight flow |
| | and freight flow to/from the harbour; however, these two flows are |
| | exempted from UFT related flows. |
| Documents | Freight Traffic Programme for Malmo (In Swedish) |
| involving transport | Sustainable Urban Mobility Plan |
| strategy and UFT | Project documents from national and international projects |
| Local transport | Environmental protection |
| goals and city- | - Making investments in energy efficient vehicles and promoting |
| specific aspects | the use of low emission vehicles |
| | Economic growth |
| | - Collaboration with freight operators, manufacturers, and |
| | receivers |
| | - Developing projects to acquire data for UTF to increase |
| | awareness on local level |
| | Increased accessibility and mobility |
| | Vibrant and attractive city centres |
| | Road safety |
| | - Promoting safe and efficient city logistics |
| | Reducing congestion |
| Policy measures | Low emission zones: |
| | - Euro 2 can no longer enter |
| | - The latest Euro 3 can be driven is 2015 (if first registered in |
| | 2007) |
| | - Euro 4 vehicles can be driven until 2016, regardless of the year |
| | of registration |
| | - Euro 5 and EEV vehicles can be driven until 2020, regardless |
| | of the year of registration |
| | - Penalty: 1000 SEK |
| | Size restrictions: Vehicles longer than 12 meters are not allowed to |
| | enter the city centre for deliveries (Exceptions: Outskirts of the city |
| | and harbour zone) |

Table 4.6 Malmö Summary

| | Time window restrictions in pedestrianised areasWeight restrictions in combination with nighttime delivery ban for | |
|---|--|--|
| | | |
| | HGVs | |
| | - 7,5 tonnes and heavier vehicles are not allowed to make | |
| | deliveries between 10 pm and 6 am in the city centre | |
| | Designated LUBs: The longest designated LUBs are in the | |
| | medieval centre of the city | |
| | Urban consolidation centres: | |
| | - Commercial UCC: Terminated | |
| - A dedicated UCC for the distribution of freight to school | | |
| | Vehicle Recognition Scheme | |
| | - Not applicable | |
| Key performance | Key performance indicators are in place. Except road casualties, | |
| indicators and | and the level of emission as well as other pollutants, the | |
| targets | municipality does not have numbers yet as they recently develop | |
| | these KPIs: | |
| | CO ₂ emission and other pollutants (NO _x and PM ₁₀): Overall traffic | |
| | Road casualties: Overall traffic | |
| | Number of HGVs on identified streets | |
| | Number of companies within logistics industry in Malmö | |
| | Percentage of HGVs not fulfilling the requirements of | |
| | environmental zone | |
| | Feeling of safety concerning heavy traffic among public | |
| International and | SamCity (National), Smile (EU), SUMPs-UP (EU), ADVANCE | |
| national projects | (EU) | |

4.3.4 Bristol

4.3.4.1 Overview of the city

Bristol is the largest city in the southwest of England with a population of about 463 400 inhabitants. The city is a part of West of England Combined Authority. All sorts of goods arrive or pass through the city. Bristol accommodates high volume of through traffic, as it does not have a ring road that can handle current demand. In addition to HGVs and LGVs, cycles are used commonly to deliver small parcels around the city centre. According to the city council, UFT contributes to the economic growth in the city and economic growth can attract more businesses to come in Bristol. UFT also creates disbenefits for the city such as poor air quality, noise pollution, road casualties and congestion particularly. Bristol suffers from the lack of complete ring road and it adds on top of the congestion problem, because vehicles, which need to travel to other destinations, must pass through already congested city centre.

4.3.4.2 Policy measures in place

Freight is a part of many different documents, which are developed by Bristol alone and together with the combined authority. UFT is presented as a part of some of these documents such as Joint Transport Plan (JTP) and Bristol's SUMP. Bristol is also in preparation of its own transport plan, which will include 20-year transport mission of the city, and freight is going to be a part of it. Main policy goals concentrate on reducing carbon emission, reducing congestion, supporting economic growth, increasing health, safety and security and increasing accessibility. The city council also focuses on promoting low emission vehicles and they seek to enlarge the scope of UCC scheme and to identify other clean incentives that can be implemented together with UCC.

The city does not have a large variety of freight policies in place. The city council implements the following initiatives and policies: (1) dedicated loading/unloading bays on the city's arterial routes and on permanently pedestrianised areas, (2) parking restrictions, (3) loading restrictions (4) the urban consolidation centre, (4) air quality management area, and (5) construction management plan/construction method statement. There is only one-time related policy which is

applicable in connection with loading restrictions and delivery times in the permanently pedestrianised zones. There is no exemption in place for the electric vehicles of the UCC in these pedestrianised zones, however the electric vehicles have dedicated LUBs pedestrianised areas. Recently the city council started to analyse putting a vehicle ban in action on roads and implement clean air zones in the city. Recently the city council initiated a feasibility study for evaluating a recognition system for number plates. The results will provide outputs concerning the system that needs to be set up used when clean air zones (UK version of LEZ) are introduced in the UK and particularly in Bristol. Apart from the city council, the police can also enforce policy measures, which also affect delivery vehicles. These policy measures are national policies regarding weight (e.g. structural) and size (e.g. width, height and length).

The city council initiated a freight consolidation scheme in 2004, which serves 150 businesses in the centres of two cities, Bristol and Bath. The UCC bases on a partnership between a private courier company and the city councils. The UCC uses electric vehicles to deliver the goods. In Bristol, the UCC's vehicles cover the majority of the pedestrianised areas, where shops are located. These vehicles have their own dedicated loading/unloading bays in these areas. The collaboration between public and private stakeholders becomes as one of the crucial success factors in the scheme. Bristol City Council works with Bristol Improvement District in order to raise the profile of the UCC and attract more users to join the scheme as the demand for the UCC has remained relatively low and hence is still subsidised.

Bristol and Bath city councils have difference in executing the UCC in their city centres. Bath implements the exemption from the time window restriction for the electric vehicles used in the UCC. Bristol does not have any connected policies in place such as time window restrictions. However, Bristol's city council showed an interest in implementing policies and exemptions in combination with the UCC as such supportive policies can incentivise more businesses to start using the scheme. They started to work on two propositions such as exemptions in the clean air zone if businesses use the UCC's electric vehicles and granting the electric vehicles with the access to other roads where they can bypass congested areas in the city centre.

Bristol's city council identify targets and performance indicators. The local transport plan includes targets related to the number of vehicles, number of cyclists and pedestrians, road casualties, modal split, and journey times. The city council does measurements based on these KPIs periodically. Bristol sets the target for air quality and identify KPIs, which relate to emission levels and it is the only target that the city council measure to observe the impact of the UCC in the city. The interviewee mentioned that they meet their targets for particular KPIs such as increasing the number of cyclists in the city; on the other hand, they fall behind their KPIs in meeting air quality objectives:

"I guess the aim is to reduce the number of vehicles, increase number of cyclists and pedestrians so we do have targets for modal split; we are on track with most of those. We are certainly exceeding the cycling one anyway. For the UCC, we don't have any targets apart from the air quality targets,, but we got the consolidation centre, but we have got targets, they are not really targets but levels that need to be met in order for the centre to be sustaining, and unfortunately we are not meeting those ones either."

4.3.4.3 The process of policymaking

The Bristol council does not have dedicated personnel or a department for UFT. Various departments such as Air Quality and Strategic Transport work together to set objectives, implement measures and to participate in UFT projects. The city council mentioned that financial constraints play an important role in the lack of a dedicated personnel. On the other hand, it was mentioned that it was turned into an advantageous situation because, in this way, these departments can work in different types of transport projects that involves other modes of transportation, which freight becomes a part of. The city council learns about policies via searching best practices around Europe. In addition, they participate conferences and meetings to learn about what other local authorities doing in terms of implementing UFT policies and to exchange experiences.

Congestion and air quality are the most prioritised concerns when the city council chooses their policies. Air quality is considered as the most oppressing factor when they choose their policies. Besides hazardous impacts of polluting vehicles on the environment and societal health, it is also an oppressing factor on government's agenda. In addition, congestion becomes an issue because it slows down the economic activities. The city council wants to contribute economic growth by mitigating transportation related problems.

There are other factors that have direct and indirect influence in implementing freight policies in the cities such as public acceptability, relations with businesses and operators, land—use policies, and lack of resources. Bristol considers public acceptability as an influential factor and they consult the public when they decide to implement a new policy. They do the public consultation via their stakeholder engagement group. Land-use is another issue that becomes influential in the context of transport planning and policy. It was mentioned that land-use policies (e.g. housing policies) are prioritised over transport policies depending on needs. Relationship between the local authority and businesses have an impact on, for instance, sustainability of the UCC scheme as its management and coordination belongs to a private operator and the users of the UCC consists of various retail businesses from Bristol.

Lack of resources is another key influence on freight policy in Bristol. The council sources its funding from central government and from external projects (e.g. EU VIVALDI). Financial resources become scarce when it comes to subsidise the current UCC scheme and that forces the council to chase for more external funding such as EU projects, until the scheme becomes self-sustainable. It was mentioned that, becoming a combined authority will provide more financial sources and it will provide more freedom to use available funding. The city council investigates the influences of both non-freight and other freight modes on UFT. For instance, Bristol has permanent pedestrianised areas in their city centre, which are only open during certain time of a day for all vehicles for loading/unloading purposes. However, only the UCC's vehicles have their own dedicated loading/unloading bays.

Bristol is actively involved in external and internal collaborations. Their main collaborators are other internal departments (e.g. The Department of Air Quality), central government (to develop solutions for mitigating air quality problems), combined authority (e.g. joint transport plan), universities (EU VIVALDI) and businesses/operators (implementation of UCC scheme). Bristol City Council is also involved in various EU projects that focus on transport issues in general and UFT in specific such as VIVALDI, ENDURANCE and BUMP (Boosting Urban Mobility Plans). Bristol City Council is not involved in any accreditation or certification program. They won European Green Capital award in 2015.

4.3.4.4 Conclusion

Bristol focuses on reducing carbon emission, increasing health, safety, supporting economic growth and security, increasing mobility as their goals. The city council emphasises two particular issues such as environmental protection (e.g. reducing carbon emission) and congestion, when they implement freight policies and initiatives. In the case of Bristol, it is possible to see that the city council implements the policies that can help to meet their local transport goals. They implement AQMAs to control the emission levels in polluted areas of Bristol such as the city centre. The consolidation centre enables the city council to achieve reducing congestion and reduce carbon emission at certain degrees. The city council achieves savings in total carbon emission and distance travelled by unsustainable vehicles via initiating the UCC. However, they mentioned that they still fall behind of their targets concerning carbon emission because the impact of the UCC is limited by its scale. The UCC also helps to improve the safety of vulnerable road users (e.g. pedestrians, cyclists) as it replaces majority of HGVs, which used to visit the city centres, by light electric vehicles.

Reduction in number of HGVs helps to mitigate the problem concerning congestion in the locations, where the UCC's vehicles make deliveries. The city council works on developing solutions that can expand the use of the UCC amongst different stakeholders. For instance, the council has plans to make propositions to use the UCC for municipal goods, deliveries that arrive at the university's campus, and the deliveries that are made to particular zones (e.g., St Nicholas Markets). The UCC serves only to the retailers selling non-food and medium value products. The city council is planning to expand into construction, office supplies and food products. In this way, they can increase the area covered by low emission vehicles and it can contribute to environmental and congestion related goals.

There are other initiatives which are aimed at reducing congestion in particular zones such as construction areas. The city council publish Construction Method Statement (or Construction Management Plan) to restrict delivery vehicles including delivery vehicles in places, where construction is under progress. These enforcements can be linked to the goal, which aims to reducing congestion by controlling the level of traffic. The city council also implements loading and parking restrictions in order to avoid vehicles' invasion in congested roads and the city centre. Other restrictions such as size restrictions and weight restrictions, which aim to avoid structural damages in sensitive areas and to remove HGVs from residential areas, have less significant impact on meeting the local goals in comparison to the impact of the UCC. These restrictions are less likely to achieve wider environmental, safety and congestion related relief in the city in the long term because they have limited abilities in achieving long-term mitigation and success. Table 4.7 summarises the key information about UFT in Bristol.

| BRISTOL | | |
|---------------------------|---|--|
| Features | Content | |
| Population | 463,400 | |
| Types of goods | Food, non-food consumer goods, waste and goods that occur | |
| | due to through traffic | |
| Documents involving | Joint Transport Plan 3 | |
| transport strategy and | Sustainable Urban Mobility Plan | |
| UFT | Project reports and other documentations (e.g. consultation | |
| | reports) | |
| Local transport goals and | Environmental protection | |
| city-specific aspects | - Reducing carbon emission | |
| | - Promoting low emission vehicles | |
| | Economic growth | |
| | - Enlarge the scope of UCC scheme and to identify other | |
| | clean incentives that can be implemented together with | |
| | UCC | |
| | Increased accessibility and mobility | |
| | Reducing congestion | |
| | Road safety | |
| Policy measures | Parking restrictions: | |
| | - Applicable in illegal parking on loading bays | |
| | - Vehicles with a maximum laden weight exceeding 3,5 | |
| | tonnes are not eligible for residents' parking scheme | |
| | Loading restrictions in combination with time window | |
| | restrictions: | |
| | - In Controlled Parking Zones indicated with kerb flashes | |
| | - On congested roads during various morning and evening | |
| | peak hours (Monday to Friday) | |
| | Air Quality Management Areas | |
| | - NO _X and PM ₁₀ | |
| | Construction management plan/construction method | |
| | statement: Restrict vehicles' travel around construction | |
| | zones | |

Table 4.7 Bristol Summary

| | Time window restrictions in permanently pedestrianised |
|----------------------------|---|
| | areas |
| | - No entry at any time |
| | Urban consolidation centres in combination with exemptions |
| | from time window restrictions |
| | - Type of goods: non-perishable consumer goods |
| | - Bristol: No exemptions |
| | - Bath: Vehicles coming from |
| | Designated LUBs |
| | Weight restrictions |
| | - Structural |
| | Weight restrictions |
| | - Environmental |
| | - HGVs are banned the residential areas of Bristol |
| | Size restrictions:Structural |
| | Vehicle Recognition Scheme |
| | - Not applicable |
| Key performance | Total vehicle count: Overall traffic |
| indicators and targets | Number of cyclists and pedestrians |
| | Road casualties: Overall traffic |
| | Model split: Overall traffic |
| | Journey times: Overall traffic |
| | Other pollutants (NO _x and PM ₁₀): Overall traffic |
| | CO ₂ Emission: Vehicles of the UCC |
| International and national | VIVALDI (EU), ENDURANCE (EU), Boosting Urban |
| projects | Mobility Plans (BUMP) (EU) |

4.3.5 Birmingham

4.3.5.1 Overview of the city

Birmingham is the major city in West Midlands with 1.1 million habitants and it is one of the constituent members of West Midlands Combined Authority (WMCA). Freight distribution within the city is mainly dominated by retailing goods such as food, non-perishable consumer products. Historically, Birmingham accommodated intensive flow of industrial freight as it constituted a major industrial city, which is not the case nowadays. It was mentioned that a lot of the old industrial area has now became residential. Birmingham also has wholesale market where fresh food items are transported. The main benefits of UFT in Birmingham is its contribution to economic vitality of the city. Pollution caused by freight vehicles is mentioned the most significant disadvantage of UFT.

4.3.5.2 Policy measures in place

Freight is a part of both Birmingham's strategy and WMCA's strategy. Birmingham Connected Mobility Action Plan, West Midlands Freight Strategy and West Midlands Metropolitan Freight Strategy 2030 are the main strategy documents. Birmingham's freight related strategy and goals are mentioned in these documents. Available documents do not cover UFT policies and initiatives extensively but provide information about some of them, which are currently in place. The main policy goals are to increase accessibility to/in the city centre, reduce emission, to increase road safety, to contribute in the local economy and to reduce number of vehicles come into the city (to mitigate congestion).

The city implements time window restrictions, parking restrictions in controlled parking zones and loading restrictions. There is also a night ban for HGVs over three and a half tonnes. There is a ban on overnight parking in the city centre. The city council will introduce Clean Air Zones (CAZs) in 2020 (Please see Appendix A for further information). In connection with CAZs, the city council is planning to bring restrictions on type of vehicles including freight vehicles. Birmingham declared AQMAs to control the level of emission in particular zones. The city council is planning to with external stakeholders (e.g., offices) to prepare delivery service plans

for the city centre. In order to execute the project, the city council identified how companies organise their deliveries to their promises and problems that they encountered when deliveries arrive. Birmingham also implements height restriction on bridges and weight restriction on places where structural restrictions exist.

Birmingham does not have a UCC. The freight strategy involves a prospective plan concerning a UCC. However, the city council states that such centre should be financed and run by private stakeholders as the council does not have resources available to subsidise a project. The city council sets KPIs about pollution levels and journey time reliability in the city however there is no numbers identified concerning journey times. There are certain levels that Birmingham needs to achieve concerning air quality. The city council assumes that freight vehicles are one of the major contributors to air pollution in the city.

4.3.5.3 The process of policymaking

The city council does not have dedicated personnel or a department to handle UFT. It is one of the tasks that is assigned to Transportation and Connectivity Economy Directorate in the council. The city council first looks at the existing policies in the UK when they want to implement freight policies. Their decision-making in terms of type of policies and adaption methods are driven by their air quality, congestion and road safety goals. Public acceptability, relations with businesses and operators, landuse policies and lack of resources are other factors that they may have influence on the council's policy choice.

Public acceptability influences the choice of policies in Birmingham. It is mainly because features of the city changed over the last 10-15 years and offices are replaced by residential areas in city centres. In these resident-intense areas, people become more sensitive towards particular UFT policies, for example, night-time deliveries were objected to by residents living in and around central Birmingham due to noise. Therefore, Birmingham does public consultation in order to inform residents when they make changes in delivery practices. The council keeps in touch with freight operators and logistics companies via West Midlands Freight Council when they discuss freight related issues. Businesses and operators do not have a notable influence on the choice of policy. In terms of land-use planning, it was brought up that there are plenty of grocery stores opened and spread around the city; however, their delivery plans were not designed properly in advance when permissions were given. There is an obvious interaction between land use policies and transport policies in Birmingham, but it is not discussed in the context of UFT. Lack of resources becomes an issue when the city council identifies a useful policy such as UCC schemes, but they cannot take further actions to implement or subsidise such projects alone due to budget constraints. As a combined authority, collaboration is a necessity for Birmingham City Council to discuss UFT policies and strategies. After the cancellation of West Midlands FQP, they decided to form another urban freight forum for WMCA. They are also working together with the Department for Environment, Food and Rural Affairs (DEFRA) in managing AQMA.

Birmingham City Council also involves in EU projects; they are one of the partners in Opticities project. The aim is to develop a traffic management system that will enable traffic officers to predict scenarios of traffic levels in advance and use this information to reduce congestion on the Strategic Road network through variation in signal timings and via delivering this real time information to travellers. At the moment, they also work on a project which aims to collect data of freight movements on particular places, which are called Green Travel Districts. Birmingham is also one of the first cities in the UK that published its own SUMP called Birmingham Connected. The city is also working with Fleet Operators Recognition Scheme (FORS) and they discuss possibilities to extend the scope towards waste collection vehicles in Birmingham.

4.3.5.4 Conclusion

The city council focus on supporting economic growth, increasing accessibility and mobility, environmental protection (e.g. reducing carbon emission), reducing the congestion and increasing road safety. The city has the following policies in place that affect freight movement in the city. They are time window restrictions, controlled parking zones and night ban for HGVs. The whole city also has AQMAs. The current restrictions in place help the city council to achieve their goals partially. Controlled parking zones in combination with time window restrictions help them to keep

vehicles away from the core centres of the city, which will enable them to reduce the congestion in these areas. It also helps to provide a safe feeling for pedestrians, cyclists and other vulnerable road users.

The city does not provide competent policies that relate to the reduction of carbon emission caused by vehicle traffic. The city council declared AQMAs in the whole city and they measure particular pollutants such as NOx and PM₁₀. The city council focus on pollution levels of vehicles other than delivery vehicles as freight is not acknowledged as a significant contributor of the problem. They measure journey time reliability and emission levels for vehicles, but they do not look at the impact of freight vehicles separately. Birmingham also has weight and height restrictions in place. These restrictions are in place to protect particular roads and bridges and they do not aim to fulfil the goals. Besides structural weight restriction, night ban is applied in combination with a weight restriction, which bans delivery vehicles over three and a half tonnes from parking on particular streets during the nighttime. This type of weight restriction can help in avoiding congestion and noise pollution around the residential areas.

The city council do not have stronger links between its goals and freight policies as they have very few policies in places, and they can help to achieve only some of the goals such as reducing the congestion caused by delivery vehicles. The existing policies do not reflect solely on freight issues but aim to mitigate transport related problems on the level of all vehicles. By 2020*, the city council will declare CAZs in the city, which will apply restrictions on vehicles regarding their engine standards and fuel types. Reducing the congestion is one of the top priorities in the agenda. The city council joined the EU project Opticities to develop an adaptive traffic management system. The system will enable authorities to collect traffic data and the data will enable estimating the level of traffic during the certain times of the day. These estimations will be used to reorganise signal timings and to provide real time information to road users when they are travelling. It can be argued that Birmingham City Council is interested in investigating UFT issues in the city.

The city council also has another ongoing project, which aims to prepare delivery service plans together with the businesses located in the core centres of the city. Delivery service plans can become a useful tool to introduce freight policies and initiatives such as consolidation centres, nighttime deliveries or access restrictions with exemptions. These items can help the city council to accomplish some of their goals in the long run by enabling safer, cleaner, and more reliable deliveries in business premises. Overall, Birmingham has limited abilities to accomplish their goals with their existing freight policies. As brought up during the interview, the main reason behind is that the local authority put more emphasis on regulating public transport and car traffic. They consider freight traffic as an issue, which needs to be dealt with by freight operators unless there are significant problems that are relevant to the city council. However, the ongoing projects that the city council undertakes can produce competent policies in the long term and enable the city council to implement policies that will achieve their goals from the perspective of freight transport. Table 4.8 summarises the key information about UFT in Birmingham.

| BIRMINGHAM | | |
|----------------------------|---|--|
| Features | Content | |
| Population | 1,141,400 | |
| Types of goods | Food, non-perishable consumer goods, recyclable goods, | |
| | and waste | |
| Documents involving | Birmingham Connected Mobility Action Plan | |
| transport strategy and UFT | West Midlands Freight Strategy | |
| | West Midlands Metropolitan Freight Strategy 2030 | |
| | Sustainable Urban Mobility Plan | |
| | Traffic Regulation Orders | |
| | Projects reports and other documents | |
| Local transport goals and | Environmental protection | |
| city-specific aspects | - Reduce carbon emission and other pollutants | |
| | Economic growth | |
| | Increased accessibility and mobility | |
| | Reducing congestion | |
| | Increase road safety | |
| Policy measures | Time restrictions in pedestrianised areas | |
| | Parking restrictions: | |
| | - Applicable in illegal parking on loading bays | |
| | - Vehicles with a maximum laden weight exceeding 3,5 | |
| | tonnes are not eligible for residents' parking scheme | |
| | Loading restrictions: | |
| | - In Controlled Parking Zones indicated with kerb | |
| | flashes | |
| | - On congested roads during various morning and | |
| | evening peak hours (Monday to Friday) | |
| | Air Quality Management Area | |
| | - NO_X and PM_{10} | |
| | Night ban for deliveries in combination with weight and | |
| | time restrictions | |
| | - Vehicles over 3,5 tonnes are not allowed to park in the | |
| | city centre between 10 pm and 6 am for delivery | |
| | purposes | |

Table 4.8 Birmingham Summary

| | Designated LUBs |
|----------------------------|--|
| | Size restrictions: Structural |
| | Weight restrictions: Structural |
| | Clean Air Zones (Planned) |
| | Delivery service plans for offices located in the city centre |
| | (Planned) |
| | Vehicle Recognition Scheme |
| | - FORS |
| Key performance indicators | CO ₂ emission and other pollutants (NO _x and PM ₁₀): |
| and targets | Overall traffic |
| | Journey times: Overall traffic |
| National and international | Opticities (EU), Green Travel Districts (National) |
| projects | |

4.3.6 Greater Manchester

4.3.6.1 Overview of the city

Greater Manchester is a combined authority, which contains 2.78 million people in 10 councils. Manchester and Salford are the two largest cities having 20% of the job market in the Greater Manchester region. Transport for Greater Manchester (TfGM) is the policy-making body for Greater Manchester area. TfGM has the information about the primary industries that create freight flow and the volume of freight traffic using the road networks. Greater Manchester accommodates major companies and hauliers in the region such as DHL, Amazon, and FedEx. TfGM is aware of the manufacturing industry and their supply chain movements within the region. Greater Manchester accommodates sectors such as textile, food processing, engineering, aerospace, and broadcasting. UFT contributes to the economic growth by enabling companies like Amazon and DHL to operate in the region and by creating operational value for the manufacturing industry as well as the other sectors operating within Greater Manchester.

UFT is a necessary function to handle the reverse flow of freight and waste. According to TfGM, it is crucial to have a perspective of a complete supply chain network that consists of distribution centres, concentration zones and tracking systems. All these capabilities need to be supported by expertise and skilled workforce. However, there are some side effects of UFT; the region is facing congestion and air pollution problems. The congestion problem is exacerbated by travelling patterns of goods and people during the day because they are concentrated on particular times of the day and increase congestions. Also, rising trend in e-commerce raises the percentage of parcel deliveries to be made in work addresses, which cause congestion in the city centres. TfGM identified that road transport contributes 75% of emissions of NOx, 81% of PM₁₀ as well as 32% CO₂ emissions (Lloyd and Lamonte, 2016.). According to the same strategy, despite freight vehicles represent a small amount of the vehicle kilometres travelled on motorways and other major roads, they contribute NOx emissions the most.

4.3.6.2 Policy measures in place

Manchester's LTS and the Implementation Plan constitute two parts of TfGM's LTS III. Freight is the part of the documents that TfGM published on the transport strategy. Transport Strategy 2040, Low Emission Strategy, Air Quality Action Plan (AQAP) and Freight and Logistics and Strategy, and Delivery and Service Planning Toolkit are the main sources that includes freight as a part of the transport planning in Greater Manchester. Low Emission Strategy, Freight and Logistics Strategy, AQAP, and Delivery and Service Planning kit elaborates UFT issues in the region. These documents include action plans, transport goals and strategies rather than particular policy measures. Only the toolkit explains the use of DSP. TfGM identifies their strategies and policies around economic growth and environmental protection.

TfGM wants to achieve economic growth by facilitating the conditions that the logistics and freight sector can grow in the region. Second, TfGM aims to minimise the impacts of freight industry on environment and society by enabling sustainable distribution. TfGM also aims to achieve providing safer roads and increased accessibility and mobility for all road users. TfGM prioritises to make strategic and operational improvements to develop UFT operation in the cities as well as in the region. For instance, TfGM initiates to build enterprise zones to make sure that companies like DHL and Amazon are encouraged to stay and provide employment in Greater Manchester region.

TfGM works on policies and initiatives, which aim to avoid tension between different stakeholders. The main role of TfGM is to coordinate and provide guidance to implement policies on local levels. For instance, each individual city in the region decides their standards for policies such as for organizing LUBs, implementing size restrictions and time window restrictions. TfGM's role is to develop guidance on loading and unloading operations, which public authorities, retailers and operators can use. TfGM is also responsible to put traffic calming measures in place on a regional level, so individual cities organise local freight operations accordingly. For instance, TfGM has been working on the implementation of CAZs in the region since 2018. Previously, Manchester went to a referendum to vote for congestion charge in 2008; however, it was overwhelmingly rejected. TfGM's logistics and freight strategy consists of various planned policies and initiative such as cycle logistics programme, providing key economic centres and subregional freight facilities, finding alternatives to diesel transport refrigeration units and a policy for engine idling. In addition to policies in place in each city in Greater Manchester such as weight restrictions, size restrictions, loading and parking restrictions, designated LUBs, and AQMAs, TfGM executes feasibility studies and reviews for improving these existing policies. The studies and reviews that TfGM undertakes are on wider scales and aimed at offering solutions for the entire region of Greater Manchester. TfGM encourages local authorities and operators to be involved in the schemes such as CLOCS and FORS.

TfGM also seeks funding for delivering ECO Stars roadmaps to work towards decreasing emission levels in freight transport. TfGM reviews existing routes concerning usefulness and the conditions of signage, and they want to produce such signage so that it may be helpful for freight operators. TfGM works with freight operator and retailers to develop DSPs and retiming the delivery times to retailers' premises. Another motivation of the ECO Stars programme is to encourage freight operators and retailers to develop low emission delivery operations such as the use of local consolidation schemes and low emission vehicles such as bicycles.

TfGM undertakes feasibility studies to promote consolidation centres, the motivation for which is twofold. First, they aim to reduce the number of freight vehicles on the road to make sure that roads are safer for other users. Second, they want to use low emission vehicles in connection with their UCC project to mitigate a part of the air quality problems in the region. They consider a UCC in Manchester and their target areas are main university areas as well as the central national hospital. Based on the initial investigations, TfGM did not identify a significant level of demand coming from potential users. They look for different alternatives to consolidation such as local centres, construction centres, mobile depots and regional consolidation in Greater Manchester. TfGM do measurements for road safety, congestion and emission levels for ten cities in Greater Manchester. They also carry the measurements for NOx and PM₁₀ for the region.
4.3.6.3 The process of policymaking

TfGM has a dedicated team that work on freight and logistics in Greater Manchester. This need arose a couple of years ago when they looked for potential logistics sites around Greater Manchester and disagreements between districts appeared. TfGM is particularly interested in logistics operations in the region due to its transport related implications. TfGM works with other neighbouring authorities such as Liverpool, Leeds, Sheffield and they formed a group, which is called Urban Transport Group to discuss freight and logistics issues and exchange knowledge, although this is not constituted as a formal freight transport partnership. TfGM stated that they look at London's strategy during Olympic Games in 2012 and how London implemented their UCC scheme. TfGM takes lessons from this example when they work on their UCC project in Manchester.

TfGM's policy-making process needs to take approval from a leadership team, which consists of chief executives from the districts, chief medical and fire officers and chief constable. Before proposals are sent for approval, TfGM check their policy recommendations against their policy goals to see whether they are consistent or not. TfGM states that it is also crucial to gain local population support because all decisions are political, and citizens choose decision-makers. Therefore, citizens should be heard when making policy decisions related to transportation in cities. In the making of policies, TfGM also gets in touch with different private organisations to get their ideas on intended policies such as trade associations, logistics companies, politicians, local enterprise partnerships, suppliers, and chamber of commerce. According to TfGM, this is an important step in order to produce effective solutions for various stakeholders in GM. Land-use policies also play a major role in TfGM's choice of policy.

Greater Manchester is one of the first combined authorities to construct a spatial framework on a regional level. Greater Manchester's spatial framework not only includes housing policy but also includes planning framework for industrial development sites that relate to accessibility and transport infrastructure. They acknowledge transport as a key element to land-use planning. Lack of resources is yet another issue that affects how local authorities behave in policymaking processes. In the region, TfGM collected the responsibility on themselves, as local authorities were not able to maintain their tasks regarding air quality due to cuts in their budgets. TfGM

states that transport in urban and regional contexts cannot be left to the private sector only and efficient strategies for mitigation can be developed in collaboration between public and private organisations.

As spatial planning has an impact on transport planning, other non-freight policies affect UFT planning. TfGM works on a transport master planning that considers optimising highways and local roads to co-exist pedestrians, cyclists and freight vehicles together in limited shared spaces. TfGM collaborates with central government and government's bodies such as DEFRA and Department for Transport (DfT). GM has AQMAs, and they do air quality measurements on a local and regional level. Later these results are summited to the central government. TfGM states that their relation to higher-level authorities is based on collaboration rather than an enforceable framework. TfGM is also involved in EU projects (e.g. from the Horizon 2020 programme) and their Greater Manchester Transport Strategy 2040 is a SUMP, which has been developed as the part of the project called REFORM. Greater Manchester is also involved in another project so n reducing emission from vehicles, promoting the use of public transport and cycling, and advancing the use of digital communication tools to reduce the need for travel and goods transportation.

4.3.6.4 Conclusion

TfGM is the transport body of the Greater Manchester combined authority (GMCA). GMCA was established in 2011 as the first combined authority. Combined authorities started in England as a new type of governance, which combine two or more local authorities. Regional development is one of the aims of combined authorities. As TfGM, combined authorities may have dedicated transport bodies. TfGM focus on all aspects of transport as well as different transport modes such as maritime and rail. Road transport and particularly UFT are the parts of TfGM's strategy. As a dedicated organisation for transport, it enables TfGM to focus on exploring problems, benefits and requirements of different industries. It is important to identify these issues because it enables authorities to implement policies that will provide a clear route map to achieve their goals. TfGM has a comprehensive framework for their goals, planned policies and initiative and how they are planning to execute the policies on short term and longterm basis. The policies and initiatives are grouped under five categories in the Logistics and Freight Strategy: Strategy and stakeholder engagement, safety and regulation, operational activity, and infrastructure planning and research. Each category has at least one policy/initiative that targets to provide better UFT operations. The strong links exist between the current as well as planned policies and TfGM's goals. They are concerned about road safety, environmental protection, congestion, improved access and mobility and economic growth. TfGM promotes local authorities in the region to become members of the schemes such as FORS, CLOCS and ECO Stars. These schemes are useful not only for learning about environmentally conscious driving but also learning about safety precautions when getting involved with vulnerable road users in the traffic. They are planning to develop safety toolkits for HGVs and cyclists.

TfGM reviews practices for the intelligent use of road space in cities as cities are shared spaces by various road users and it makes roads scarce resources. Periodic reviews on the issue enables the local authorities in GM and TfGM to take precautions against congestion and road safety, which are two of the prioritised issues in TfGM's logistics and freight strategy. TfGM runs another project to review existing freight routes and availability of proper signage. TfGM aims to produce freight maps that truck drives can see available routes and see existing restrictions if any.

Except helping the cities in Greater Manchester for the execution of AQMAs, the region does not have any environmental policies in place that are specifically aimed at regulating delivery vehicles. Alternatively, TfGM have more general planned policies and initiative to achieve their environment focused goals. First, TfGM has been working with DEFRA to implement CAZs in Greater Manchester since 2018. Second, they work on policy packages that will enable freight operators and retailers to adopt environmentally friendly practices in UFT. TfGM works for developing consolidation schemes and using low and zero emission for deliveries. TfGM also promotes cycle logistics on a local level. FORS and ECO Stars work together with freight operators to reduce emission levels and TfGM works with freight operators through their logistics forums to become members of these schemes. Table 4.9 summarises the key information about UFT in Greater Manchester.

| GREATER MANCHESTER | | |
|---------------------------|--|--|
| Features | Content | |
| Population | 2.78 million in 10 districts | |
| Types of goods | Food, non-perishable consumer goods, recyclable goods, | |
| | waste and industrial goods (textile, food processing, | |
| | engineering, aerospace, and broadcasting) | |
| Documents involving | Greater Manchester Freight and Logistics Strategy | |
| transport strategy and | Greater Manchester Low Emission Strategy | |
| UFI | Greater Manchester Air Quality Action Plan | |
| | TfGM Delivery and Service Planning Toolkit | |
| | Greater Manchester Transport Strategy 2040 | |
| Local transport goals | Environmental protection | |
| and city-specific aspects | - Minimizing the impacts of freight industry on environment | |
| | and society. | |
| | Economic growth | |
| | - Facilitating the conditions that logistics and freight sector | |
| | can grow in the region. | |
| | Increased accessibility and mobility | |
| | Vibrant and attractive city centres | |
| | Reducing congestion | |
| Policy measures | Time window restrictions | |
| | Loading/parking restrictions | |
| | Size restrictions | |
| | Guidance on developing LUBs | |
| | Delivery and service planning toolkit | |
| | Air Quality Management Area | |
| | - NO _X and PM ₁₀ | |
| | Clean Air Zones (Planned) | |
| | Engine Idling policy (Planned) | |
| | Urban consolidation centre (Planned) | |
| | Vehicle recognition scheme | |
| | - FORS, CLOCS, ECO Stars | |
| Key performance | Congestion: Overall traffic | |
| indicators and targets | Road casualties: Overall traffic | |
| | CO ₂ emission and other pollutants (NO _x and PM ₁₀): Overall traffic | |
| International and | REFORM (EU), RESOLVE (EU) | |
| national projects | | |

Table 4.9 Greater Manchester Summary

4.3.7 Newcastle-upon-Tyne

4.3.7.1 Overview of the city

Newcastle-upon-Tyne is the largest city in the Northeast Combined Authority (NECA) with 302,280 habitants. NECA is the legal body that brings together seven councils. Newcastle has a whole range of consumer goods (including food and non-perishable consumer goods, food and service deliveries to nightclubs, bars, hotels, restaurants in the city, municipal goods, and industrial goods. Deliveries to university campuses constitute another type of goods flows in Newcastle. The city also has an industrial zone where companies such as Nissan have major production facilities. UFT contributes to the local economy by keeping the city supplied with essential goods, enabling manufacturing activities and creating job opportunities in Newcastle as well as in NECA region. There are also disadvantages that the city needs to mitigate such as road casualties, air quality problems and congestion especially caused by increased number of LGVs due to growing number of home deliveries.

4.3.7.2 Policy measures in place

UFT is a part of some of the documents produced by the city council and the combined authority. These documents are the joint Core Strategy and Urban Core Plan together with Gateshead Council, Air Quality Action Plan, and Compliance Statement. Compliance Statement shows how transport plans have complied with legal, policy and technical requirements. UFT is elaborated in the following statement only: "UC8: To promote sustainable freight movement and minimise the impact on the environment and quality of place, major new development in the designated Freight Management Area) will be required to provide a Delivery Service Plan (Compliance Statement, p.262)" In this compliance statement, Newcastle provides information about which strategic objectives will be supported by putting this policy in action, what measures will be included in this policy and the reasons why this policy is necessary for environmental and societal benefits. Regulations and restrictions comprising freight vehicles are published in Traffic Regulation Orders (TRO).

Freight is also covered in NECA's local transport plan. The city council and NECA aim to create a safer transportation system for all road users and encourage

mode shift towards sustainable choices on an overall level. In the context of UFT, two authorities provide strategic links and connections to other cities and regions, to improve access and mobility, reduce emissions from freight vehicles. The city council implements various policies and initiatives such as time window restriction, loading restrictions, weight restriction, size restrictions (width, length and height), designated LUBs and NECA's freight partnership provides freight maps for truck drivers. The maps show routes that trucks can use to avoid congested roads, lists of key destinations, restrictions and locations of LUBs.

Newcastle has two AQMAs in the city, where NOX levels are measured. NECA freight partnership initiated a training program for truck drivers. The purpose of the training is to provide theoretical and practical information about how to interact with vulnerable road users such as cyclists and pedestrians. The participants rode bicycles in the traffic where they come across with delivery vehicles. The city council did another study to investigate if LEZs can be implemented in Newcastle; however, the responses to the study were not positive. The city council and the University of Newcastle carried out a feasibility study on LEZs and UCCs.

Newcastle does not have a public-led UCC. The city council was involved in an EU project called Smartfusion together with the University of Newcastle and other national and international partners. The existing UCC is operated by an LSP and deliver goods to the facilities at the university campus. The city council have done a feasibility study and found out that they need to develop more comprehensive package of solutions which would fulfil the needs of different industries and not only retailing. Now, the University and the City Council work on another feasibility study to identify if the university's consolidation scheme can be expanded for making deliveries to the city council. The city council measure emission levels through the air quality stations in the city. As road safety is one of the most prioritised issues for the council and NECA, they measure road casualties. The city council also measure journey times and congestion. All these measurements are done for all road users, and they do not measure these KPIs for freight traffic separately.

4.3.7.3 The process of policymaking

There is no dedicated personnel or department to deal with UFT neither on regional level nor local level. Air quality concerns have a significant influence in the council's policy choice. During next development phase of their LTP, Newcastle will be involved in a collaborative design process with other councils within NECA. During this process, each council will analyse each other's' policies and strategies when they design their policies. Public acceptability and relationship with businesses and operators make an influence on the council's policy choice and design. When the council designs documents such as Urban Core Strategy or LTP, they do a consultation to get feedback from stakeholders such as citizens and businesses and core strategy go for public examination. There are also certain challenges of working with different stakeholders; for instance, if stakeholders understand local authorities' rationale for implementing particular restrictions, they become more flexible about working under the restrictions.

The main challenge here is about how to establish platforms to communicate these issues and how to collaborate with different stakeholders. Newcastle considers land-use policies alongside their freight policy. Local authorities are under increasing pressures regarding budget and financial resources. Government releases budget for particular projects where local authorities can apply if they have any schemes or policies planned and if they are aligned with funding calls. Newcastle prioritises sustainable ways of transportation and increasing cycling and walking areas within the city. Therefore, they consider the interaction between non-freight and freight related incentives. For instance, when designing bicycle lanes, they reroute servicing areas if freight vehicles can deliver goods via back doors of premises. If not, servicing issues are prioritised, and lanes will be designed accordingly.

Being involved in a combined authority requires a significant degree of collaboration, where local and regional strategies are developed in a joint effort. There might also be disadvantages when the degree of development amongst cities are not equal, and this might cause disagreements when authorities design their joint transport plans. Within Newcastle City Council, departments also collaborate while working with UFT such as Department of Traffic Management and Environment and Public Protection Services.

Newcastle was involved in EU C-Liege project a few years ago. This project was about promoting sustainable and safe UFT especially about reducing emission from freight transport. The project became a useful venue to share knowledge and exchange ideas with other cities around Europe. It also provided funding, which helps towards our freight policies. The city council was one of the partners in Smartfusion project funded by the EU. As a result of the project, the University of Newcastle established a consolidation centre in collaboration with Clipper Logistics, which is actively working to date. The UCC is only used for the deliveries to the university's campus. Newcastle City Council is not involved in any accreditation or accreditation programme related to UFT; however, NECA's FQP collaborates freight operators through its membership in FORS.

4.3.7.4 Conclusion

Newcastle's transport planning does not offer clear links between goals and the policies in place. The existing policies are not likely to offer long term success in achieving the local authorities' goals. Road safety, congestion and environmental protection are the most critical goals when the city council and NECA deal with UFT issues. Few numbers of the existing policies can respond to these goals. For instance, Newcastle has two AQMAs in the city and the council makes periodical measurement to control the emission levels. However, there is no evidence of how they deal with the emission problems caused by freight vehicles, or they do not present any mitigation strategies to deal with reducing emission in the future. On the other hand, the city council deals with policy actions aimed at reducing emissions from passenger transport modes such as cars and buses.

The city council develops strategies to promote more sustainable means of transportation such as increasing the use of public transport and encourage citizens to cycle and walk. Newcastle pays less attention of freight in the urban context and the investigation targeting UFT issues remained limited in the context of local transport planning. NECA freight partnership take a step forward in implementing initiatives that help to achieve safe traffic environment. The driver training program has been initiated and truck drivers, who have participated the programme, have been informed about safe driving. NECA's freight partnership provided freight maps for truck drivers.

The city council implements all kinds of restrictions such as time restrictions, size restrictions (width, length, and height) and loading restrictions. In general, restrictions help to treat the symptoms of the existing problems via banning vehicles from entering certain roads or streets. This type of restrictions can help reducing congestion or increasing road safety during certain periods of the time. Majority of the size restrictions in place are relevant to structural constraints so they do not aim to mitigate any transport related problems rather they are put in place to protect roads and bridges from potential damages. Table 4.10 summarises the key information about UFT in Newcastle-upon-Type.

| NEWCASTLE-UPON-TYNE | |
|---------------------------|---|
| Features | Content |
| Population | 302,280 |
| Types of goods | Food, non-perishable consumer goods, recyclable goods, |
| | waste, and industrial goods (automotive) |
| Documents involving | Joint Core Strategy and Urban Core Plan (Newcastle and |
| transport strategy and | Gateshead City Councils) |
| UFT | Air Quality Action Plan |
| | Compliance Statement Plan |
| | Traffic Regulation (Consolidation) Order 2009 |
| | Project reports and other documents |
| Local transport goals and | Environmental protection |
| city-specific aspects | Economic growth |
| | - Provide strategic links and connections to other cities |
| | and regions |
| | Increased accessibility and mobility |
| | Vibrant and attractive city centres |
| | Reducing congestion |
| | Road safety |
| Policy measures | Driver training programme for improved road safety |
| | Loading/Parking restrictions |
| | - Prohibition of Loading and Unloading – at any time |
| | - Other time specific examples are as follows: |
| | • 10.00 am to 5.30 pm every day |
| | • 8 am to Midnight Monday to Saturday except |
| | holidays |
| | • 8 am to 9.30 am, midday to 1 pm and 4.30 pm to 6 |
| | pm (Monday to Friday except holidays) |
| | Time window restrictions in pedestrianised areas |
| | Size restrictions: Structural |
| | Weight restrictions: Structural |
| | Designated LUBs |
| | Freight route maps |
| | Air Quality Management areas |

Table 4.10 Newcastle-upon-Tyne Summary

| | - PM ₁₀ , NO _X |
|----------------------------|--|
| | Urban consolidation centre |
| | - NECA performed a feasibility study between 2011-2012 |
| | but NECA did not identify the need for a UCC |
| | - University of Newcastle has a commercial UCC |
| | Vehicle recognition scheme: FORS |
| Key performance | CO ₂ emission and other pollutants (NO _X and PM ₁₀): Overall |
| indicators and targets | traffic |
| | Road casualties: Overall traffic |
| | Vehicle count: Overall traffic |
| | Journey times: Overall traffic |
| International and national | C-liege (EU), Smartfusion, Novelog (University), |
| projects | BESTFACT I-II (Uni of NEWC), SETRIS |

4.3.8 Aberdeen

4.3.8.1 Overview of the city

Aberdeen is the third largest city in Scotland with 228,670 habitants. Aberdeen has a harbour, which is located close to the city centre. The harbour generates a lot of transitory freight activities due to export and import activities. Aberdeen used to be an industrial city including sectors such as paper, granite and clothing. Consumer goods and service goods constitute most of the freight movement within the city. Retailing activities are concentrated in the city centre and the there is no retail outlets located in outskirts of the city. The city council considers it as an advantage from an economic perspective; however, it causes issues regarding distribution of goods to premises within the city. The port of Aberdeen used to be one of the main fishing ports in the UK. Although volumes in the fishery industry have dropped in recent years, the fishing trade in Aberdeen still exist.

Aberdeen suffers from through traffic due to lack of a bypass going around the city. Freight vehicles moving on the north-south corridor and are destined to other places than Aberdeen, must pass through the city centre. UFT contributes to the economy of the city and logistics, and freight related jobs are created as a result of having the harbour as well as other freight generating activities in the city. There are three main disadvantages that UFT cause in the city; congestion, air pollution and road casualties. Through traffic is also a contributor to the congestion problem in the city. By 2018, bypass road will be completed and through traffic will be moved to the new road.

4.3.8.2 Policy measures in place

UFT is a part of Aberdeen's LTP and Aberdeen Sustainable Freight Distribution Strategy. In the latter, the document includes both some of the existing policy measures (e.g., loading/unloading restrictions) and potential policy measures (e.g. UCC, LEZ, congestion charge) are presented. RTS and Freight Action Plan, which is prepared by The North East of Scotland Transport Partnership (NESTRANS), support these documents. There are also freight routing maps prepared by NESTRANS for HGV drivers operating in the area of Aberdeen and Aberdeenshire. The city council and NESTRANS work together to develop solutions to mitigate UFT related problems. The main goals in the policymaking concentrate on five key areas: Economy, environment, safety, integration, and congestion relief. The city council as well as NESTRANS want to achieve economic growth by enabling better transport systems in the city. They prioritise to reduce emission levels, reduce congestion, and increase road safety. They also emphasise collaboration with other stakeholders when taking actions towards organizing transport activities.

Congestion is the primary problem in Aberdeen. Both authorities want to focus on these factors to create an efficient and accessible city. They see congestion as a constraining factor to transport economics. Therefore, they aim to decrease congestion and increase journey time reliability. Aberdeen implements a list of restrictions as UFT policy measures such as time restrictions in pedestrianised areas, loading restrictions, parking restrictions and size restrictions. In addition, the city council develops particular initiatives to ease the manoeuvres of freight vehicles in congested streets. The city council together with NESTRANS develop a signalling solution, which works in an uphill street. They have inserted sensors to the traffic lights and the sensors recognise the moving freight vehicles and extend the duration of green light for the vehicles to pass. The city council implements time restrictions, size restrictions (height, weight, width), parking restrictions and loading restrictions for regulating freight transport within the city.

Aberdeen has three AQMA. The city council measure PM₁₀ and NO_X within these three areas. The city council has systems that look at certain roads and streets where HGVs meet other vulnerable road users. The output of this system is used to prepare routing maps for HGV drivers to guide them and avoid congested and crowded roads. Road traffic casualties and journey time reliabilities are also measured but on a general traffic level. NESTRANS has a different type of indicators that they measure. They follow up 51 transport related indicators. Only a few of them are related to freight transport, which do not cover UFT. The city council and NESTRANS work together on the project that aim to build "Aberdeen Western Peripheral Route". The road will enable to improve journey time reliability for freight vehicles via avoiding congested central routes and reducing journey times. NESTRANS and the city council joined ECO Stars vehicle recognition scheme in 2016 to pay more attention on eco-friendly driving and road safety.

Aberdeen does not have a UCC scheme. They did a feasibility study to identify the demand for a retailing consolidation centre and to identify stakeholders. However, there was no interest from the retailers. In addition, prospective stakeholders did not agree on sharing responsibilities and costs. The city council will make another study for a UCC project in the context of CIVITAS PORTIS project. The local authorities consider UCCs as useful initiatives as they would decrease the number of HGVs coming into the city centre for delivery purposes. Also, UCCs can decrease the time for waiting and parking on busy streets if UCC vehicles can work based on a reservation system, where receivers will book time slots to get their deliveries.

4.3.8.3 The process of policymaking

Aberdeen City Council and NESTRANS do not have a dedicated personnel or department that specifically works on UFT. Officers from both organisations (also from Aberdeenshire Council) come together via "Freight Forum" to discuss UFT related issues. It seems to be an issue of a trend. As the transport planning engineer from Aberdeen City Council mentioned that "I think cycling, 20 years ago not every council has a cycling officer, cycling was relatively small but as it became something as people realise the benefits and as promote cycling and I think freight probably has that same kind of learning curve for members and structures because we are now set up."

The new EU project CIVITAS PORTIS is also expected to bring more engagement with UFT issues within local and regional authorities. The lack of engagement is not only related to local and regional authorities; the problem is also related to freight industry and other private stakeholders that are involved in UFT such as shops, restaurants, hotels that require deliveries. Aberdeen learns about policies through national guidance via national transport strategies, collaboration platforms on local and national levels such as Freight Forum and Scottish Freight and Logistics Advisory Group (ScotFLAG). Aberdeen also works with consultants to learn about potential UFT policies that may be applicable in Aberdeen. For instance, Aberdeen Freight Distribution Strategy is a document that was prepared in collaboration with a consultant company to elaborate UFT issues of Aberdeen City.

Accountability of policy measures on a public level is also an influential factor when implementing policies, and awareness needs to be increased among residents about why it is crucial to have freight movements within the city. Before implementing a policy, TROs go for consultation of residents as well as freight operators and businesses. Aberdeen collaborates with the chamber of commerce, shop owners and freight operators through Freight Forum. New regulations are consulted with private sector and associations during forum meetings, and it is regarded as a crucial step to learn about how particular changes such as pedestrianisation would affect their businesses and operations. Land-use planning, and transport planning are considered together in Aberdeen. When local development plan identifies new development areas, for example retailing centres, it also identifies potential sites for relevant logistics activities that may occur around these development areas to protect those areas from the other main developments. Aberdeen tackles resource problems via establishing collaboration between local and regional transport authorities to identify problematic areas and to invest in right places.

Pedestrianisation becomes a popular topic in Aberdeen in the context of their City Centre Master Plan as well as their SUMP. Areas in the city centre will be pedestrianised and the city council is currently looking at re-routing of vehicle traffic around pedestrianised areas and how deliveries and servicing will be done to premises that are located within pedestrianised areas. Aberdeen works with different associations (FTA and RHA), central governmental bodies (such as DEFRA) and national government. They are also involved in EU projects. They are involved in projects where typical harbour cities are involved. StratMos is one of the EU funded projects in which Aberdeen was involved. The main output of this project is the preparation of route maps to enhance freight distribution to and from major freight destinations. They are also involved in CIVITAS PORTIS project; with this project, Aberdeen wants to shift from cars to a primary mode of transport and regenerate road space for collective and active modes of transport including freight transport. Finally, Aberdeen is accredited within ECO Stars fleet recognition scheme and the city is the first one in Scotland, which adopts the scheme on a regional level.

4.3.8.4 Conclusion

Aberdeen has some restrictions and initiatives, which the local authorities implement to calm some of the problems caused by UFT operations in the city. However, some of these policies do not provide a clear way to achieve their goals while others can help to achieve some of the local transport goals partially. Aberdeen focuses on the problems such as congestion, emission, road safety and accessibility. Loading and unloading restrictions are in place on particular streets. Truck drivers cannot do loading or unloading during certain hours of the day. This particular restriction aims to reduce the number of freight vehicles to avoid congestion in the main and the most crowded streets in the city. The hours, which the restrictions are in place, are considered based on the hours of operations of the bus lanes.

Size restrictions (width, height, and length) are relevant to structural constraints in and around the city. Due to weak bridges and weak road infrastructure, HGVs are not allowed to enter some streets or pass by some bridges. So, this type of restrictions does not help to achieve the aforementioned goals and they may cause increased distances travelled by delivery vehicles. Aberdeen implements weight restrictions. The purpose of the weight restriction is to stop through traffic travelling via the roads in the city centre. As Aberdeen does not have a city bypass, trucks travelling from southern Scotland to the north have to drive through the city. To avoid congestion caused by through traffic, the city council do not allow trucks over 7,5 tonnes to drive through certain streets in the core of the city.

All the restrictions are presented in the freight maps, which have been produced as a result of the project called StrathMos. The weight restriction can help the local authorities to mitigate congestion related problems in the city. However, Aberdeen needs a city bypass in the long run because the vehicles causing through traffic also increase the level of emission within the city. Therefore, the project that Aberdeen develops or building a peripheral route can help the local authority to mitigate congestion and emission problems in a certain extent.

Initiatives such as the signalling system can be useful for solving congestion and reducing carbon emission that is released due to stop and star. However, its impact will be particular to the area of application, and it will not be generalised due to the type of the initiative. The city council and NESTRANS take actions to control and reduce carbon emission and other pollutants (e.g., PM₁₀ and NO_x). Aberdeen has AQMAs and the local authorities encourage to become members for vehicles recognition schemes such as ECO Stars. The city council became a member of ECO Stars recently to work on reducing emission levels caused by buses. They also have collaboration with freight operators through NESTRANS' freight forum and they incentivise private companies to join ECO Stars. Apart from these initiatives, Aberdeen does not have any regulation, which aim at reducing the levels of carbon emission and other pollutants.

LEZ^{*} is one of the regulations that the city council worked on; however, they did not enforce LEZs in the city due to two main reasons. First, it was not possible to identify which authority would monitor the zones in the city. Second, the principles of the policy and the enforcing bodies were not clearly identified by the authorities[†]. The city council works on other project, where they try to develop traffic calming measures on a particular road in Aberdeen. The study focusses on granting freight vehicles with the access to bus lanes on the road. The city council thinks that freight vehicles can share the bus lanes with the buses because the lane do not accommodate a significant number of buses and it would help to decrease the congestion on that particular area. Designated LUBs are other types of initiatives that may reduce congestion and save freight vehicles from driving around to find a stop to make their deliveries. The city council mentioned that they do not provide designated LUBs widely around the city because vehicles can stop at anywhere in the city (except in the areas and during the restricted hours) for loading and unloading. This approach can save the local authorities a certain level of emission and congestion if parking restrictions for other vehicles are enforced properly, so freight vehicles can park on the spots, where other vehicles are not allowed. Table 4.11 summarises the key information about UFT in Aberdeen.

[†] Please see Appendix A for further update on Low Emission Zones in Aberdeen.

| ABERDEEN | |
|-----------------|---|
| Features | Content |
| Population | 228 670 |
| Types of goods | Food, non-perishable consumer goods, recyclable goods, waste, |
| | industrial goods (oil), import & exports goods through harbour, goods |
| | created by through traffic |
| Documents | Local Transport Plan |
| involving | Aberdeen sustainable Freight Distribution Strategy |
| transport | Regional transport Strategy and Freight Action Plan |
| strategy and | Project reports and other documents (e.g. consultancy reports) |
| UFT | |
| Local transport | Environmental protection |
| goals and | Economic growth |
| specific | - Collaboration with other stakeholders when taking actions towards |
| objectives | organizing transport activities. |
| | Increased accessibility and mobility |
| | Reducing congestion |
| | Road safety |
| Policy measures | Freight vehicle priority traffic signalling |
| | Loading/ Parking Restrictions |
| | - Prohibition of Loading and Unloading – at any time |
| | - Time-limited loading and unloading on single or double yellow |
| | lines (Max. 40 minutes) |
| | - Other time specific examples are as follows: |
| | • Monday – Friday – 8.00am – 9.30am |
| | • Monday – Friday – 12.30pm – 2.30pm |
| | • Monday – Friday – 4,00pm – 6.00pm |
| | - Parking restrictions are in place for various cases including illegal |
| | parking on LUBs. |
| | Time window restrictions in pedestrianised areas |
| | Time window restrictions for deliveries during late night and early |
| | morning |
| | Size restrictions: Structural |
| | Weight restrictions: Structural |

Table 4.11 Aberdeen Summary

| | Weight restriction | |
|---|--|--|
| | - Freight vehicles over 7,5 tonnes are not allowed to stop zones | |
| | located in the city centre (except for loading) to stop through | |
| | traffic passing by the city centre. | |
| | Freight route maps | |
| | Air Quality Management areas | |
| | - PM_{10} and NO_X | |
| Granting freight vehicles with the access to public transport | | |
| | infrastructure (Planned) | |
| | Low Emission Zone (Planned) | |
| | Urban consolidation centre | |
| | - Feasibility study has been completed but enough demand has not | |
| | been provided | |
| | - Another consolidation project will be discussed in the current | |
| | project "CIVITAS PORTIS" | |
| | Vehicle recognition scheme | |
| | - ECO Stars | |
| Key | CO ₂ emission and other pollutants (NO _X and PM ₁₀): Overall traffic | |
| performance | Road casualties: Overall traffic | |
| indicators and | Journey time reliability: Overall traffic | |
| targets | | |
| International | CIVITAS PORTIS (EU), StratMos (EU) | |
| and national | | |
| projects | | |

4.3.9 Dundee

4.3.9.1 Overview of the city

Dundee is the fourth largest city in Scotland with 149 320 habitants. Dundee accommodates freight flow including manufacturing and consumer goods such as food, clothing, non-perishable consumer goods and service deliveries to hotels, bars, restaurants, and cafes. Printing, journalism and tyre industries run their production operations in Dundee. The city also has a large retail core. It is also observed that local shops create an increasing amount of inbound as well as outbound freight flows. Dundee also has a port where bulk items such as grains are carried throughout the year. Freight movements comprise various types of shipments from bulk products to small parcel deliveries. UFT is regarded as an accelerator for the economy. If goods arrive in Dundee and they are efficiently distributed within the city, it enables current businesses to remain in the city, and it may attract new businesses to come to Dundee. The is also be achieved by conscious design and implementation of policy measures. Freight vehicles cause disbenefits as well; increasing emission levels due to HGVs, inefficient loading (resulting as a higher number of vehicles appear on roads), congestion are the main problems that UFT contributes in Dundee.

4.3.9.2 Policy measures in place

The city council has three documents and all three include aspects related to UFT. The documents are LTP, SULP and SUMP. There is also the RTS, which has been published by Tayside and Central Scotland transport Partnership (TACTRAN). RTS identifies regional transport strategies for Angus, Dundee City, Perth & Kinross and Stirling. The city council identifies three main driving factors such as efficiency, economy and environment. The city council aims to regulate transport activities in a way that they can preserve existing economy, use existing resources efficiently and protect the natural environment. They prioritise to reduce air pollution, to reduce congestion and to increase accessibility in the city.

There are no particular policy measures in place for regulating freight vehicles in Dundee except some roads including low bridges or having unsuitable width. Existing regulations are valid for all vehicles except buses in Dundee. The main reasons are stated as lack of resources, lack of dedicated staff and prioritizing other traffic elements such as public transport, cycling and pedestrianisation. The city council implements various restrictions such as time, size and loading related restrictions. The restrictions are published in TROs. The regulation orders define permitted hours, permitted type of vehicles for loading/unloading and parking restrictions. The city council provides designated LUBs.

Time restrictions are in place in the centre of the city, where pedestrianised areas are located. One-way orders, where traffic barriers are located, are also implemented to stop through vehicle traffic within the city centre. TACTRAN provides interactive road freight maps for each city and town in their region. These maps guide truck drivers and provides route maps based on potential destinations such as retailing zones, lorry parking areas, university premises and ports. The city council identified that service deliveries comprise a share of urban movements. As the city council mentioned that their service agents travel within the city quite often, they established a clean procurement strategy, where they own zero emission vehicles for their use. The city council argues that they can avoid producing emission due to their frequent service trips.

Dundee does not have a UCC. However, a designated feasibility study is required in the context of an EU project (ENCLOSE). However, the city council states that their budget is limited to make financial contributions to a consolidation project, and it should be a commercial initiative. The city council also lean towards collaboration opportunities with the private sector to tackle barriers that make private companies hesitate to initiate a UCC project as well as offering regulatory support. There is no freight focused KPIs, but their indicators have a broader scope, which comprises all transport modes. Since Dundee has AQMAs, they monitor indicators for air quality, and they are aware of where air pollution makes peak within the city and related traffic volumes in those areas.

Road casualties is another KPI that the city council follows up periodically. It was brought up that in recent years, there was a decline in the level of traffic, and this is correlated with changing the behaviour of people regarding commuting, where people do not have to travel to work or school every day, and they can work and study in the distance. Dundee used to implement a toll on Tay Bridge. However, it was cancelled because of the toll on the bridge because it creates congestion that prolonged journey times around the bridge and in the city centre during particular hours.

4.3.9.3 The process of policymaking

The city council does not have any dedicated personnel or department to focus on UFT in the city. Instead, UFT is handled by a collaboration of different people as well as departments. Professional engagement and networking are two main channels that Dundee learns about potential UFT policies. The choice of policies is based on the council's goals related to congestion, air quality, road safety and current TROs. The council has regular consultation meetings with the public to listen to their ideas and suggestions based on existing traffic regulations. Among many other issues related to the city, transport related issues get particular attention from the citizens as transport affects their daily lives heavily, but the citizens' attention focus on public transport and mobility issues particularly.

The city council develops their relationship and collaboration with businesses running in the city centre and chamber of commerce to be aware of their problems and requirements. On the other hand, communication and collaboration with freight industry. Few of these organisations are in contact with the council and the relationship between two parties develop based on problems either parties encounter. It is one of the Tactran's roles to establish communication and collaboration platforms for local authorities, regional authority, and the freight industry to work together.

Land-use planning policies are related to transport planning policies in Dundee. City master plan brings these two policy functions together. Previously, the city development used to concentrate on the harbour and its surroundings. Now the city responds to different requirements of what different transport modes require and what citizens of the city demand from their local authority. Dundee develops projects that target to extend green spaces, enhance road and railway infrastructures. For instance, there is an ongoing project, which is called Dundee Waterfront. In the context of this project, Dundee aims to decrease freight flow that goes to premises, which will be in Waterfront. Also, they built new roads targeting freight vehicles that drive towards the port; these roads will prevent HGVs to pass through the city centre, instead, they will go around it. The city also considers impacts of non-freight policies on UFT policies. Dundee Waterfront project and pedestrianised city core are presented as examples how the city council finds ways to balance requirements of different transport modes. The council often use traffic modelling to see how freight traffic and traffic, in general, would be affected when new bus lanes, new cycling and walking areas and new pedestrianised areas will be designed. When the council issues non-freight TROs, they go through various consultation processes such as public consultation or consultation with business and operators to receive their feedbacks. Different departments within Dundee City Council work collaboratively to discuss UFT issues and implement policies. The council decreased the number of departments over the years, and main reasons behind this decision were stated as budget cuts and in some cases such as to decrease the complexity of workload as well as decision making processes.

The city council works with the other local councils in the region such as Perth & Kinross and, Angus through TACTRAN. Unless there is a strategic and national issue such as planning to build a ring road around Dundee or based on national air quality strategies, the Council does not collaborate with national or central governments often. Dundee is actively involved in EU projects; there are two projects specifically focused on UFT issues; they are Lamilo (through TACTRAN) and ENCLOSE. They obtained funding from Smart Cities initiative through Scottish government. Dundee sees benefits of collaborating different partners from Europe and exchanging knowledge, which they think they would enable them to make common mistakes in implementing general transport policies and UFT policies. Dundee is involved in ECO Stars vehicle recognition scheme. Local freight transport companies, local bus operators in Dundee and the council's fleet are participating in the scheme.

4.3.9.4 Conclusion

Dundee does not have any freight focused policies. The existing restrictions comprise all vehicles except buses on Dundee's roads. The city council considers freight is a part of their transport planning. The city council in collaboration with the regional transport partnership, TACTRAN participated EU funded projects to identify logistics related issues and develop strategies to facilitate more efficient logistics operations in Dundee. The city council identified that the existing infrastructure and the policies in place offer a good basis for UFT in the city. The city council did not identify any problem, which occurs solely due to the movements of freight vehicles in the city. In comparison to the previous case cities, freight vehicles are not considered as a cause of detrimental impacts but the contributors together with other vehicles in the traffic. The city council still focus on fixing the issues that UFT contributes in the city. However, it does not require the city council to enforce policies but instead they implement soft measures that aims to incentivise freight industry and retailers to run their UFT operations in more sustainable ways such as using low emission vehicles, participating vehicle recognition schemes or initiating consolidation schemes.

Freight activities are concentrated on the core of the city where they control the vehicle movement by time window restrictions and loading/unloading restrictions. They developed the solution to mitigate congestion and to improve pedestrians' mobility by removing vehicles from the city centre during certain hours of the day. The city also implements loading/unloading restriction in the city centre but in order to avoid congestion problem that may occur during peak delivery times, and they provide designated LUBs. The misuse of LUBs by other vehicles and the violation of loading/unloading restrictions by truck drivers are the most significant problems that the city council identify. They enforce parking fines to prevent other vehicles to park on designated LUBs and implement fines for improper parking by truck drivers. Dundee also implements size restrictions for heavy vehicles, but these restrictions are in place to prevent structural damages that freight vehicles may cause on roads and bridges.

The city council also focus on increasing the air quality in Dundee. Even though freight vehicles are not the most significant contributors to local emission levels (Public transport is one of the most significant contributors), the city council works on incentives to decrease the emission levels caused by freight vehicles. First, Dundee has AQMAs, and they measure NO_X and PM₁₀ levels in the entire city. The city council measure the pollutants for all types of vehicles; therefore, the local authority has the information about the effect of various types of vehicles on the air pollution. The city council works with the air quality goals in relation to UFT under three main categories: First, they have a long-term plan for initiating a consolidation scheme in the city. It is a long-term plan as the city council wants to find an operator, which can make the required investment. The city council want to have an initiator's role and they are planning to give infrastructure support. Second, the city council want to incentivise freight operators to become members of vehicle recognition schemes such as ECO Stars. They want freight operators to reduce the environmental and societal impacts of road freight transport by learning eco-friendly and safe driving techniques. In the third category, the city council wants to become a role model for other freight operators and businesses by initiating low emission vehicles in the council's fleet. They adopted electric powered LGVs for their own freight operations in the city.

It can be concluded that lack of dedicated policies results in failing local authorities to meet their local transport goals. Local authorities can fall into this situation because they do not acknowledge UFT as a part of their transport planning and they do not spend any effort to identify problems and gains of UFT on local levels. It is not the case in Dundee. The information collected from Dundee shows that the city council is keen to investigate current logistics trends, problems and benefits of UFT. The city council's strategy is that they implement small scale initiatives if seen necessary instead of bringing policies that require long term commitments. Cities like Dundee can benefit from such strategies if they do periodical check-ups to observe the pace of alteration in the trends of UFT and other businesses. For instance, the impact of fast-growing e-commerce captures the attention of both local authorities and businesses. Second, Dundee's strategy can work well if they can respond quickly to changes by modifying the current initiatives or implementing new policies. Table 4.12 summarises the key information about UFT in Dundee.

| DUNDEE | | |
|----------------------------|---|--|
| Features | Content | |
| Population | 149,320 | |
| Types of goods | Food, non-perishable consumer goods, recyclable goods, | |
| | waste, and industrial goods (tyre, printing and journalism) | |
| Documents involving | Local Transport Plan | |
| transport strategy and UFT | Air Quality Action Plan | |
| | Sustainable Urban Logistics Plan | |
| | Sustainable Urban Mobility Plan | |
| | TACTRAN Regional Transport Strategy | |
| | Project reports and other documents | |
| Local transport goals and | Environmental protection | |
| city-specific aspects | - Reduce emissions from the Council 's Fleet | |
| | - Reduce emission from HGVs | |
| | Economic growth | |
| | Increased accessibility and mobility | |
| | Reducing congestion | |
| | Road safety | |
| Policy measures | Driver training programme for improved road safety | |
| | Loading restrictions / Parking restrictions | |
| | - Prohibition of Loading and Unloading – at any time | |
| | Time window restrictions in pedestrianised areas | |
| | - No vehicles allowed between 11 am an 4 pm | |
| | Size restrictions (including width, length, height) | |
| | - Structural | |
| | Interactive freight route maps | |
| | Air Quality Management areas | |
| | - PM ₁₀ and NO _x | |
| | Low Emission Zones (Planned) | |
| | Designated LUBs | |
| | Urban consolidation centre: | |
| | - Planned but no action taken | |
| | - Previous UCC project led by TACTRAN has been | |
| | cancelled. | |

Table 4.12 Dundee Summary

| | Toll on the Tay bridge |
|----------------------------|---|
| | - Cancelled due to congestion problems |
| | Vehicle Recognition Schemes |
| | - ECO Stars |
| Key performance indicators | CO_2 emission and other pollutants (NO _X and PM ₁₀): |
| and targets | Overall traffic |
| | Road casualties: Overall traffic |
| | Total vehicle count: Overall traffic |
| International and national | LaMilo (EU), ENCLOSE (EU) |
| projects | |

4.3.10 Glasgow

4.3.10.1 Overview of the city

Glasgow is the largest city in Scotland with its 633,120 inhabitants. Glasgow City is a member of Strathclyde Partnership for Transport (SPT), which is the Regional Transport Partnership for the west of Scotland. In Glasgow City, three main types of goods generate the freight transport in Glasgow. The first flow is related to retailing; various types of consumer goods (e.g. food, clothing, laundry deliveries) are delivered to main retail zones such as Buchannan Street in Glasgow. The second type of freight movement is home deliveries to residential areas. This type of deliveries increases continuously in connection with increasing trends in e-commerce. The third freight group consists of industrial goods that are moved to an industrial zone located next to main waterway corridors.

UFT is considered as a functional aspect of the city's economy as it supplies goods to retail, industrial and public premises (e.g. schools and hospitals). On the other hand, with online economy's boost during recent years and in the future, Glasgow expects more deliveries are coming into the city centre and going to residential areas. They found it challenging to predict how to react to rapidly changing patterns in UFT especially in residential areas. In such areas, they have a capacity to accommodate some trucks and vans. However, increasing number of vans can cause congestion and air pollution in places, where the council also needs to offer a quiet and less congested environment for residents. In general, congestion and air pollution are the two main problems that UFT cause within the city.

4.3.10.2 Policy measures in place

City Centre Transport Strategy and RTS by SPT are the two main documents that includes information about freight transport and UFT. In addition to RTS, SPT conducts a study to publish a new document that focuses on freight transport strategy. They will publish freight strategies and freight related goals, which belong to member authorities of SPT. The policies in place are published in TROs. Glasgow has a "City Centre Transport Hierarchy", which lists different transport elements based on their strategic importance for the city. The list consists of pedestrians, public transport, cyclists, freight and car/motorcycle in this exact order.

The primary objective of the city council is to increase sustainability. The city council explains how to achieve sustainability in five specific goals: (1) To encourage citizens to cycle and walk, (2) To ensure access for residents, blue badge holders, tourists and traffic essentials to sustain economic function, (3) To enhance the quality of main pedestrian spaces, key development areas and main access routes, (4) To reduce harmful traffic emissions and noise; and (5) To enhance road safety and personal security for all city centre users.

The city council implements various types of restrictions such as loading restrictions, parking restrictions and time window restrictions in specific pedestrianised areas (e.g. Buchanan Street). If businesses have works to do around areas, where restrictions are applicable, they have a possibility to apply for temporary exemptions from the restrictions. The city council publishes policy related information online. Glasgow does not implement any specific size or weight restrictions. Apart from loading and parking restrictions, there are designated loading/unloading areas in the city. The decision where to put areas is made based on agglomeration of businesses that needs servicing areas. Vehicles heavier than 10 tonnes are not allowed to drive in the city centre.

The city council works on reducing the number of cars travelling to the city centre. The plan is to remove the existing parking spaces in the city centre and to direct people towards using parking spaces located on the peripheral of the city centre. Parking restrictions targeting individual cars, aim to provide better accessibility to the city centre for other road users such as public transport, freight vehicles and pedestrians. The Department of Air Quality measures and follows pollutant levels particularly PM₁₀ and NO_x, as Glasgow has AQMAs. The city council and Transport Scotland are working together or air quality related matters as Transport Scotland operates the city motorways and traffic on the motorways influence heavily air quality and levels of traffic around Glasgow.

There is no UCC in use in Glasgow. There are two issues are shown as the reasons; first, the council did a survey amongst retailers to analyse potential demand

for a consolidation centre. However, they found out that many premises served by international logistics companies already get their deliveries consolidated by these logistics companies. Second, when Glasgow is compared to other big cities such as Barcelona or London, the city has a smaller city centre where delivery and servicing are relatively easier. Delivery vehicles can enter the city easily and they are offered servicing areas for loading and unloading operations. The city is planning to look at another consolidation project, which will be similar to the consolidation project that took place during the Commonwealth Games in 2014.

Glasgow sets targets and performance indicators about their transport activities. However, they were suffering from lack of resources and as a result they were not able to follow up their targets, which were published in the LTS. They have problems about data collection as well, which does not enable them to do further analysis on identified performance measures. The city council does vehicle count (including cycles) and they measure the level of different pollutants.

4.3.10.3 The process of policymaking

The city council does not have a dedicated personnel or department that work with UFT only. Various departments deal with freight issues in the city. The main reason is that freight is regarded as a regional matter and Glasgow does not have any rail terminals within its boundaries, which generates freight in larger volumes. Therefore, UFT (as well as freight in general) is not counted as significant as other transport matters and no dedicated resources exist on local level. In Glasgow City Council, Development Services and Land & Environment Services deal with freight in the context of the city.

New development proposals are evaluated by Development Services, while Land and Environment Service manages with daily operational routines (follow up if traffic networks operate without a problem) and promotes new TROs. Desk-based research and international projects (e.g. SUGAR) enable the council to learn about potential policies. Objectives and plans defined by national and central governments drive their policy choice. Higher-level objectives influence the city council to define their overarching goals such as improved sustainability (particularly environmental) and improved air quality. Under these two main goals, the local authority implements dedicated plans and policies.

Public acceptability is another influential factor on the council's policy implementation. Their LTS went through consultation processes by different stakeholders such as public representatives and industry groups. LTS were refined after the council got feedbacks as a result of consultation process. Land use planning and transport planning are two related aspects in policy-making decisions. Development Service of the council analyse development proposals based on their accessibility measures. For instance, industrials zones are developed on lands, which are near motorways to ensure they are accessible, because accessibility gains importance if further progress is made possible. Significance of UFT and lack of resources are two topics that one triggers another. Since UFT does not obtain high priority on local agenda, dedicated resources remain limited. However, freight is still an important aspect of city's economy and development.

The interplay between non-freight policies and freight policies should be balanced. For instance, Glasgow wants to reduce number of parking places for private cars in order to avoid invasion of cars in the city centre because it has impacts on other road users. Therefore, the council's goal is to focus putting parking spaces on periphery of the city centre and to allow access to central parking spaces for essential users like residents, blue badge holders and for servicing. However, there are particular policies measures that the council implements and their adverse effects on UFT are acknowledged but no solutions are offered. Glasgow implements bus only zones and shops around these zones cannot get deliveries unless they open their premises before 7 am. The council obtains benefits about improving air quality and these benefits are prioritised over freight deliveries within that particular zone. This situation seems consistent with the city's transport hierarchy, where public transport is prioritised over UFT in the city centre.

The city council works together with particular organisations when dealing with transport related issues such as SPT, Road Haulage Association (RHA) and Transport Scotland. They are not involved in FQP, and the council finds challenging to negotiate with freight industry over their priorities as well as the industry's priorities. On regional level, SPT is in close collaboration with Transport for Scotland and Scottish Government, as SPT needs to nest in their strategies and policies within strategies of higher level. There is a feedback loop between SPT and government bodies and SPT and local authorities. SPT are consulted in their policy-making processes to discuss about changes and implementations. Glasgow City Council involved in an initiative which is called as Sustainable Urban Goods Logistics Achieved by Regional and local policies (SUGAR). It promotes "the exchange, discussion and transfer of policy experience, knowledge and good practices in the field of urban freight management, with regards to policy and planning levers, between advanced and less experienced city sites." (SUGAR, 2017) The council was participating as an observer to get to know about existing practices in European cities. Glasgow City Council is a member of ECO Stars.

4.3.10.4 Conclusion

The goals identified do not relate to UFT directly. Four out of five goals enable the city council to choose policies, which will help them also to facilitate efficient UFT in Glasgow. If remembering the transport hierarchy, the city council prioritises the issues that come first. Therefore, they do not prioritise the implementation of freight focused policies in the first place. However, they will implement policies and initiatives that will target pedestrians, public transport, and cyclist, which will also affect freight transport. Policies aiming to reduce the number of the vehicles on streets will increase the accessibility and the mobility for pedestrians and cyclists. In addition, policies incentivising people to use public transport more and to cycle help to decrease carbon emission and congestion in the city centre. They are the main reasons why the city council do not focus on implementing freight focused policies instead they implement restrictions that affect all types of vehicles.

Congestion, access restrictions, illegal parking, and insufficient signing are the most common problems, which freight companies come across on the national level, according to Glasgow's Air Quality Action Plan. Illegal parking on LUBs and on the yellow lines, where loading may be allowed can cause congestion on busy roads that many road users need to share. The city council meet parking needs of freight vehicles to reduce potential congestion and road safety issues by providing designated LUBs. Freight vehicles, which are over 7,5 tonnes are normally not allowed to stop on verges of pavements; however, they may stop for loading and unloading purposes. Also, the

city council enforce fines for illegal parking on designated LUBs to protect these places for the use of freight vehicles. The city council makes sure that all exceptions and rules are presented, where the policies are in actions. All these initiatives and policies can help reduce the level of congestion that occur due to freight vehicles.

The city council also implement time window restrictions in order to reduce the vehicle traffic in certain zones and to prioritise pedestrians. The city council implements different variations of time window restrictions to reduce the problems for freight vehicles, which need to visit several places at the one time. The city council is a member of ECO Stars vehicle recognition scheme. As the city council has the biggest fleet in Glasgow, they affiliate their fleet in ECO Stars to learn how to mitigate air pollution problems caused by their HGVs and LGVs. Glasgow also has AQMA, where they measure NOx and PM₁₀ pollutants. They do the measurements for the general traffic and they look at if they meet their annual objectives. As a result of the general assessments completed in 2015, the city council decided to revoke the current city wide AQMA in respect of PM₁₀ and made changes to add PM₁₀ objectives in other AQMAs in the city. Air quality plays a key role in Glasgow's sustainability objectives. The city council and SPT is doing feasibility studies to implement LEZ in Glasgow[‡]. LEZ will also bring restrictions for freight vehicles. In conclusion, Glasgow focuses on other transport elements as well as non-freight policies more than freight policies to achieve the local transport goals instead. Table 4.13 summarises the key information about UFT in Glasgow.

[‡] Please see Appendix A for the updates about Low Emission Zones in Glasgow

| GLASGOW | |
|----------------------------|---|
| Features | Content |
| Population | 633,120 |
| Types of goods | Food, non-perishable consumer goods, recyclable goods, |
| | and waste |
| Documents involving | City Centre Transport strategy |
| transport strategy and UFT | Regional Transport Strategy |
| | Project reports and other documents |
| Local transport goals and | Environmental protection |
| city-specific aspects | - To reduce harmful traffic emissions and noise from |
| | vehicles |
| | Increased accessibility and mobility |
| | Reducing congestion |
| | Road safety |
| Policy measures | Loading restrictions / Parking restrictions |
| | - Prohibition of Loading and Unloading – at any time |
| | - Parking restrictions are applicable in the case of illegal |
| | parking on designated LUBs |
| | Time window restrictions in pedestrianised areas |
| | - Between 11 am and 4 pm |
| | Weight restrictions |
| | - Vehicles heavier than 10 tonnes are not allowed to drive |
| | in the city centre. |
| | - Vehicles over 7,5 tonnes are normally not allowed to |
| | stop on verges of pavements except loading and |
| | unloading purposes. |
| | Designated loading and unloading areas |
| | Air Quality Management areas |
| | - NO _x and PM ₁₀ (has been revoked in 2015 in the city |
| | centre) |
| | Low Emission Zones (Planned) |
| | Vehicle Recognition Schemes |
| | - ECO Starts |
| Key performance | CO_2 emission and other pollutants (NO _x and PM ₁₀): Overall |
| indicators and targets | traffic |
| | Road casualties: Overall traffic |
| | Vehicle count: Overall traffic |
| International and national | SUGAR (EU) |
| projects | |

Table 4.13 Glasgow Summary

4.3.11 Edinburgh

4.3.11.1 Overview of the city

Edinburgh is the capital city of Scotland with its 524,930 habitants. Freight movements within the city consist of deliveries to retailers and business premises. There is an increasing trend of home deliveries due to current boom of e-commerce and its impact on retailing activities. Construction and manufacturing related freight flow also exit but they are limited in scale. Major distribution centres that are serving premises in the city centre are located closer to the city bypass or around the national motorway network. Road transport is the main mode to make local deliveries. UFT contributes to the city's economy because it enables delivery of consumer goods to premises and they keep places such as hospitals, schools, restaurants, bars supplied with essential items. It is hard to achieve these purposes without allowing freight vehicles into the city. However, such vehicles bring various disadvantages to Edinburgh such as noise, road casualties, air pollution and congestion. Night-time deliveries could be proposed as a solution by shifting some of the freight vehicles to night-time, however Edinburgh has residential areas around its city centre and nighttime deliveries cause noise pollution.

4.3.11.2 Policy measures in place

The city council has a local transport strategy, which elaborates freight related goals about how to design efficient freight transport in the city. LTS includes eight objectives that the city council is planning to do about freight movements in Edinburgh. Majority of these points are related to road freight transport and organisation of road transport in the city centre such as seeking to provide adequate opportunities for loading and unloading, collaboration with freight industry for developing emission control measures and investigating how to facilitate home deliveries within the city. They are stated in their LTS, but the city council does not provide a time frame or a roadmap about implementing relevant policies and initiatives according to these goals.

The city council has two main goals in terms of freight transport within the city these are (1) increasing the efficiency of freight movement and deliveries to and within the
city and (2) collaborating with the freight sector in trying to minimise the environmental impact of deliveries. South East of Scotland Transport Partnership (SEStran), which is the regional transport partnership for the cities located on South East of Scotland including Edinburgh, provides more concrete goals on general traffic and less clear goals on UFT. SEStran aims to decrease the use of fossil fuels, to encourage people to cycle more, walk more, and make public transport modes accessible for everybody. SEStran mostly focus on air pollution problem in the context of UFT. They aim to work collaboratively with freight industry and Road Haulage Association to focus on efficient use of freight vehicles.

The city council implements different types of restrictions that targets both freight and non-freight vehicles such as loading restrictions, weight restrictions and time window restrictions. For instance, Royal Mile, the historic core of Edinburgh, is pedestrianised during the particular hours of the day, which ban vehicles to drive in/through during restricted hours. Weight restrictions for HGVs are in place on some streets, where structural constraints exist. The city council also implements time-based or permanent loading restrictions. Time based loading restrictions do not allow vehicles to execute loading and unloading operations during the peak hours of the day. Permanent loading restrictions ban vehicles from loading and unloading forever. The city council provides designated LUBs for freight vehicles. Parking restrictions are also in place in Edinburgh. These restrictions are implemented to avoid illegal parking on designated LUBs and in other places such as pavements and kerbsides.

SEStran also does studies concerning UFT. They have completed Freight Study & Action Plan in 2010. The study presents the results from a fieldwork that aimed to review the current situations and results from interviews with stakeholders. SEStran also carried a stakeholder workshop to discuss issues to be able to develop a comprehensive freight strategy, which respond various needs of stakeholders. The main topics that were discussed in this study are as follows (1) FQP Communication Strategy, (2) Freight Routing Strategy and Mapping, (3) Consolidation Centre Study, (4) Sustainable Delivery into Edinburgh, (5) Regional Guidance on Loading Bays and (6) SEStran Truck stop and Parking Analysis (SEStran, 2010).

In the study, SEStran analysed three freight focused policies such as LEZ, UCC and sharing public transport vehicles for freight. However, none of these

measures are in place currently§. In addition, the city council worked on developing an automated pre-booking system for loading/unloading bays; however, it did not draw an attention from freight operators. Currently, SEStran and the central government started to discuss about possibilities in implementing LEZs in the region. It was mentioned in that current circumstances do not provide a suitable platform to establish a UCC in Edinburgh; on the other hand, the city council's Transport Vision 2030 includes a plan to have a consolidation project, but its details are not presented.

Edinburgh's LTS include 28 indicators and six of these indicators can be related to road freight transport such as road casualties, greenhouse gas emission, overall level of motor traffic, CO₂ emission from council transport, time taken to implement TRO and percentage of road network maintenance. SEStran was involved in an EU-funded dry port project to investigate a location for this dry port and concluded that it would be located in Coltbridge. Later, they also looked at the possibility of having another consolidation centre, which would be in Grangemouth where a lot of port traffic is intersecting. However, there is no specific study was completed for the city centre.

4.3.11.3 The process of policymaking

Neither Edinburgh City council nor SEStran have dedicated personnel or department that deal with UFT. The council does not provide any evidence concerning how they learn and how to choose policies that they aim to implement. On the other hand, SEStran is driven by the objectives that are mentioned in their RTS and they learn through policies that are implemented on EU level. However, they are not able to accomplish every goal that they stated in RTS due to lack of funding. Besides funding related issues, public acceptability is an influential factor on the city's choice policy. This is mainly because Edinburgh has a strong lobby groups that are responsible for city's heritage. In addition, TRO process also requires mandatory consultation with a list of consultants.

As it is for public acceptability, when a particular TRO or policy measure would be implemented, these decisions are consulted with relevant branches of industry. Edinburgh has Strategic Development Plan, where transport and land-use

[§] Please see Appendix A for further information about the policy measures

planners designed together. The purpose is to acknowledge and integrate transport related requirements when a development plan is proposed. The council wants to make sure that what transport implication would appear in a new development plan. Edinburgh considers the effect of non-freight issues on UFT, and this can be observed within their LTS. For instance, the council aims to deliver a cycle friendly city; in accordance with this goal, they aim to review and strength parking and loading restrictions in existing cycle lanes. The council also prioritises pedestrians, cyclists and public transport by removing parking and loading/unloading bays, when necessary.

SEStran acts as a partnership platform and brings 8 councils together to discuss their transport issues. SEStran involved in many EU funded projects however there is no project that has UFT focus; some of these projects are Connecting Food Port Regions, Lo-Pinod, and Dryport Project. The most recent project is called REGIO-MOB. The aim of this project is to improve interregional cooperation to support sustainable mobility and sustainable growth. Finally, Edinburgh is involved in ECO Stars vehicle recognition scheme.

4.3.11.4 Conclusion

Edinburgh does not have any freight focused policies that help the city council to achieve their UFT goals on local level. Similar to other Scottish case cities, the city council implements various restrictions, which ban freight vehicles from the traffic temporarily or permanently. Edinburgh's transport vision focusses on environmental protection, increased accessibility and mobility that includes to encourage walking, cycling and public transport use, ensuring roads' safety, economic growth, and enabling reliable journey times for people, goods and services. In connection to these goals, these goals are accomplished in the context of various transport aspects such as public transport or freight transport. Edinburgh's LTS includes action plans for prospective policies and initiatives for enabling efficient and environmentally friendly freight transport in the city.

The current restrictions in place do mitigate UFT related problems daily because local authorities cannot impose such restrictions permanently in the most cases. They have to allow for loading and unloading operations or they need to allow freight vehicles drive to pedestrianised areas to supply premises with essential goods and services. The city council presents particular prospective policy measures and initiatives that they aim to undertake. While the city council presents the roadmaps to implement some of these policies, the rest of them are elaborated unclearly. For instance, the city council aim to reduce environmental and societal impacts of UFT, and they collaborate freight operators through ECO Stars vehicle recognition scheme to include operators in future proposals for emission control measures.

One of the most prioritised topics by the city council is to provide designated LUBs. SEStran's freight study found out that finding places available for loading and unloading is a significant concern for other stakeholders in addition to congestion, illegal parking and time restrictions. LTS often mentioned about reviewing and organizing LUBs in the city. However, there is no study or report identified, which presents a review or a development concerning designated LUBs. Promoting clean vehicles is another goal concerning freight transport. The city council aims to review their procurement procedures for transport services that they buy from freight operators. They will make their choices based on freight operators environmental and safety acts and will prefer the ones, which has the least impact concerning safety and environmental effects.

Edinburgh's LTS mentions some of innovative solutions for UFT such as UCC, facilitating home deliveries as a part of the review of LUBs and lorry parking. However, the city council does not want to be the main investor in projects, which may initiate one of the solutions. Even though they are aware of the altering trends, they do not want to implement any policies and initiatives unless UFT has obvious detrimental impacts on environment and society. For instance, freight operators demand an overnight lorry parking from the city council as well as SEStran and operators request the city council to involve with a potential project. On the other hand, the city council mentions that the existing commercial park is inadequate on environmental grounds. Table 4.14 summarises the key information about UFT in Edinburgh.

| EDINBURGH | | | | | |
|------------------------|--|--|--|--|--|
| Features | Content | | | | |
| Population | 524,930 | | | | |
| Types of goods | Food, non-perishable consumer goods, recyclable goods, waste, | | | | |
| | and industrial goods (automotive) | | | | |
| Documents involving | Local transport Strategy | | | | |
| transport strategy and | Regional Transport Strategy | | | | |
| UFT | SEStran Freight Study and Action Plan | | | | |
| | Traffic Regulation (Consolidation) Order 2009 | | | | |
| | Project reports and other documents | | | | |
| Local transport goals | Environmental protection | | | | |
| and city-specific | - Collaboration with freight industry for developing emission | | | | |
| aspects | control measures | | | | |
| | - Increasing the efficiency of freight movement and deliveries | | | | |
| | to and within the city | | | | |
| | Economic growth | | | | |
| | Increased accessibility and mobility | | | | |
| | - Providing adequate opportunities for loading and unloading | | | | |
| | Reducing congestion | | | | |
| | - Investigating how to facilitate home deliveries within the | | | | |
| | city | | | | |
| | Road safety | | | | |
| | Loading restrictions / Parking restrictions | | | | |
| | - Prohibition of Loading and Unloading – at any time | | | | |
| | - Permanent restrictions comprising peak hours during the | | | | |
| | day | | | | |
| | - Parking restrictions are applicable in the case of illegal | | | | |
| | parking on designated LUBs | | | | |
| Policy measures | Time window restrictions in pedestrianised areas | | | | |
| | Weight restrictions: Structural | | | | |
| | Designated LUBs | | | | |
| | Air Quality Management areas | | | | |
| | - PM ₁₀ and NO _x | | | | |
| | Low Emission Zones (Planned) | | | | |

Table 4.14 Edinburgh summary

| | Vehicle Recognition Schemes | | | | |
|------------------------|--|--|--|--|--|
| | - ECO Stars | | | | |
| Key performance | CO_2 emission and other pollutants (PM_{10} and NO_x): Overall | | | | |
| indicators and targets | traffic (and specifically caused by council related traffic) | | | | |
| | Road casualties: Overall traffic | | | | |
| | Vehicle count: Overall traffic | | | | |
| | Percentage of road network maintenance | | | | |
| | Time taken to implement TRO | | | | |
| International and | REGIO-MOB (EU, SEStran participates), Connecting Food | | | | |
| national projects | Port Regions, Lo-Pinod, Dryport in Edinburgh under Interreg | | | | |
| | IVb North Sea Region programme, SURFLOGH | | | | |

4.4 Influences on UFT policy choice

The case data in the previous section were used to establish the differences between the cities in terms of their actual policy choices. This section presents the findings of the cross-case analysis according to the analytical framework, based on the results of the interviews exploring how and why these choices came about. Rather than compare city by city, this section summarises the role played by each of the main influences on the UFT policy choice process and identifies some of the broader trends between the different countries. The three theoretical categories are drawn from Marsden and Reardon (2017) while the sub-categories within each of these three sections are taken from the previous papers on UFT policy covered in the literature review.

4.4.1 Policy context and governance dynamic

4.4.1.1 Collaboration between governance scales and within departments

Overall, local authorities' relationship with their national governments is based on collaboration rather than an enforceable framework. Collaboration between different departments is very common in the case countries but in varying degrees. The local authorities that have dedicated personnel show a higher degree of collaboration, whereby UFT planners work together with city planners and road safety officers when there is a new project in residential or industrial areas. According to the interviewees, the main motivation behind the collaboration is to identify solutions about how different requirements can be fulfilled and how transport modes can co-exist.

In Sweden, environmental zones are part of the NTS, but municipalities deal with its implementation at the city level. EU and national projects also help municipalities obtain extra financial resources to be able to implement UFT measures. The municipalities also commented that implementation of policies as a result of these projects enables them to obtain legitimacy in the eyes of the national government. One of the interviewees in Sweden mentioned that "These projects are contributing with money and resources but the most important thing I think is that they contribute for political acknowledgement. Even though we do not get our politicians with us, the projects have been the way to get questions up on their agenda." This enables municipalities to strengthen their hand when they want to bring UFT issues to the national agenda.

In England and Scotland, interdepartmental collaboration is also common. They do not have dedicated personnel for transport (except Greater Manchester) but departments dealing with city planning, road safety and air quality work together when UFT related issues arise. However, the degree of collaboration and clarity in defining responsibilities concerning UFT between different departments was less clear compared to the case of Sweden. One Scottish interviewee said: "We try to power freight issues as only one small part of our job. It is the same for every other aspect. We have got all these different things and we do not have many people." More specifically regarding coordinating different policy areas into the overall transport strategy, another officer from Scotland stated: "We had to cut down the policy and unfortunately freight is not part of the Local Transport Strategy. It is kind of a struggle to the departments in the council. Together with Development and Regeneration Services and Land and Environmental Services we have to include in the upcoming update on the Local Transport Strategy. Then, we speak to the colleagues from Air Quality and Economic Development teams to make sure that they are happy with what is happening."

At the same time, combined authorities in England provide an official framework to strengthen collaboration between cities. In addition to potential benefits of combined authorities, there is also a risk of power imbalance between cities involved in the same combined authority when developing strategies. Thus, authorities can have disagreements when designing joint transport plans. The interviewee from TfGM raised the following issue "There was no dedicated personnel until two or three years ago. We were having a look at a potential logistics site around Greater Manchester and there was a huge disagreement between districts and [consultancy company] on where those sites should be, and we had a practical interest on this because of the transport implications."

4.4.1.2 Land-use planning

There is a common opinion among the local authorities that if a new development project is initiated, all relevant departments including transport planning should work

together as the design of transport networks is an important element of accessibility and these new development sites should be accessible by all modes. Yet sometimes unexpected challenges arise. For example, Stockholm City municipality wanted to develop an online booking system whereby truck drivers can book LUBs in advance. According to the Swedish National Legislation, however, streets including kerbsides are considered public spaces and they cannot be dedicated to the use of public or private parties. In England and Scotland, local authorities are also aware that land-use policies affect UFT and related transport policies. However, there is a lack of involvement of freight in land-use decisions beginning from the early stages of city development. For instance, when city planners grant companies (e.g. grocery stores) approval to open branches in city centres, they do not consider how deliveries will be made and if loading/unloading facilities can be designed to complete delivery operations properly. In order to tackle such problems, interdepartmental collaboration should be prioritised to increase awareness regarding freight in cities. In Scotland, municipalities recommend that delivery and loading requirements should be defined and they should be included in city development plans.

4.4.2 Role of non-freight transport policies

In the interviews, loading/unloading bays and pedestrianised areas were mentioned as the most common cause of conflict between freight and passenger transport needs. Loading/unloading bays are constrained by extended pedestrianised areas and cycling lanes. Freight vehicles are also constrained by bus lanes. Especially in Scotland (Aberdeen and Glasgow), there are designated bus lanes that freight trucks are not allowed to use. Local authorities use simulation models to visualise impacts of changes made in other transport modes. For instance, In Scotland, Glasgow and Aberdeen councils use traffic modelling to see how freight traffic would be affected if certain zones are pedestrianised or new bus lanes are added. In Sweden, they build low speed zones where pedestrians, cyclists and vehicles exist together.

Shared space is another issue where local authorities receive reactions from businesses and freight operators. The local authorities started to implement bold restrictions to provide more space for walking and cycling via pedestrianisation and removal of parking spaces. The local authorities need to consider the needs of urban freight movements such as building dedicated loading and unloading places as was brought up by one interviewee from Scotland: "If you do not have the right parking controls and particularly the enforcement of parking, waiting and loading controls, they have got to drive around and look for finding a space to park. . . . So, all that extra movement of traffic obviously adds to congestion." In order to overcome these challenges, some local authorities and freight forwarders have initiated consolidation centre projects. These consolidation centres own electric vehicles which are allowed to enter in pedestrianised areas with exemptions from time window restrictions, examples being Bristol, Gothenburg, and Stockholm.

4.4.3 Resource availability

4.4.3.1 Financial resources

Lack of financial resources is the main reason why so many local authorities do not have dedicated UFT personnel or why some local authorities are not able to measure their KPIs in order to monitor their policies' performance. UFT resources are more seriously limited in English and Scottish councils compared to Swedish municipalities. There has been a recent change in governance of local authorities in England, creating combined authorities which can obtain more power and resources for the cities involved. In the case of Greater Manchester, they are more active in terms of considering UFT in their transport strategies. In England and Scotland, national governments prioritised walking, cycling and public transport, therefore, funding calls target these priorities and local authorities design their strategies and policies around these priorities. If a local authority wants to implement policy measures concerning UFT, they need to find their own resources. For instance, Bristol, Edinburgh, Aberdeen, and Dundee are the examples from England and Scotland of cities involved in EU projects to obtain funds to develop freight solutions in their cities. Swedish authorities have likewise expanded their resources by active involvement in several UFT projects.

4.4.3.2 Dedicated UFT personnel

Stockholm and Gothenburg have dedicated personnel who are full time employees to deal with UFT. Malmö used to have dedicated personnel but, due to lack of resources, currently two individual transport planners handle UFT in addition to other tasks. In England, none of the individual councils has dedicated personnel. However, the newly combined authorities are entitled to have more power and more resources. Some of these combined authorities consider logistics and freight as crucial activities because of their contribution to growth and development. With this enlarged vision, combined authorities such as TfGM established a separate department to deal with UFT. In Scotland, the local authorities do not have dedicated personnel. One interviewee in Scotland stated, "If we would have more personnel, we may dedicate more time towards freight or indeed any other individual area, but we do not have resources to do it, that's the problem."

4.4.3.3 Project participation

It is quite common that local and regional authorities are involved in EU projects, however the local authorities were revealed to have different motivations. While some of the authorities are involved only for exchanging knowledge and experiences, other authorities are actively involved in developing policy measures for their cities, particularly when the project can provide direct funding for such measures, often for a trial period. The case cities have joined various projects concerning city development, sustainability, urban mobility, public transport and freight transport (including both long-haul and urban freight). Even if they do not join the project themselves, local authorities can benefit when other actors such as regional authorities or universities become project partners to fund studies and pilots in the city area. The rate of participation in UFT projects is the highest in Sweden, particularly Stockholm and Gothenburg. In England, Newcastle, Bristol and Birmingham showed higher levels of participation. Scotland has the lowest numbers of local authorities participating in UFT related projects.

4.4.4 Legitimacy

4.4.4.1 Relationship with businesses and operators

Sweden and England demonstrated a higher degree of external collaboration compared to Scotland. Swedish local authorities are willing to establish stronger links with other public and private organisations. For example, both Stockholm and Gothenburg are actively involved in several initiatives with universities and with private freight operators. In England there were also some examples where local authorities and combined authorities collaborate to implement freight focused policies, such as the Bristol and Bath consolidation centre. The majority of the local authorities in Scotland mentioned that they experience a lack of interest from businesses and operators. One interviewee from Scotland stated that: "Local hauliers, trucks and logistics can reach me or my engineers if they need to and we are open to that, and there is a small number who do contact us but as an industry they are not knocking our door down." A regional transport authority TACTRAN working with local authorities in Dundee and Perth tried to initiate a consolidation centre project but ultimately it was not taken forward due to a lack of interest from the private sector.

Sweden is the most proactive country towards working with representatives of the private sector, stating that businesses and operators should be in close cooperation because UFT policies impact on freight operations within cities. This is also related to the fact that the case cities from Sweden implement various dedicated measures to regulate freight activities, but it is important that they do it in a collaborative manner. They developed a principle which requires that businesses and freight operators should be involved in the policy-making process from an early stage as it will enable the local authorities to obtain professional input for their transport planning and to develop policies that are more efficient. A Swedish local authority stated: "You should not do something which you did not really ask in advance; check with stakeholders and then you can just do it. . .." We implement the solutions when we get all those professional views. If there is a specific interest, we get input and we can adjust some parts and develop our own proposals."

The choice of policy measures for freight traffic is usually driven by local authorities rather than operators. On the other hand, the local authorities hesitate to implement many restrictive policies as they do not want to drive away businesses and freight operators, which contribute to economic prosperity in the cities. This is elaborated by the interviewee from Bristol as "We talked to the customers of the UCC around the city before we implement any restrictive movement policies and it threatens the deal for freight operators." It was also identified that the lack of acceptance from private stakeholders can weaken political positions of local authorities when they want to implement policies. Consultation processes, freight forums or stakeholder meetings

become particularly useful to obtain the support as well as the feedback from private stakeholders. A local authority from Sweden stated: "It is a matter of choosing the way of compromising instead of regulating. It is easier because you do not make decisions that are not welcomed by them." The local authorities in England and Scotland are increasingly aware that they need to engage with private stakeholders, but the issue for them is not so much that the operators will react against policies but that businesses and operators are not even willing to cooperate in the first place unless they see a specific problem. One noted that "It's often difficult to get the businesses to participate and give up the time to come and participate in these meetings but we try as much as we can to make sure that we understand what their needs are and we are doing things to help them."

4.4.4.2 Public acceptability

All case cities acknowledge the importance of gaining public acceptability and they want to increase awareness concerning freight among residents. They consider it crucial to make citizens understand the dynamics behind transport goals and policies. According to the interviewees, citizens were considered less sensitive towards UFT policy measures than freight operators. However, it was identified that there is an impact of changing geography and lifestyles on public acceptability; for instance, when the population of households agglomerate closer to the city centres, they may become more sensitive towards some freight policies such as OHD. Another issue is that citizens might be disturbed by an increasing freight flow in a particular area and they can raise complaints to local authorities.

On the other hand, public acceptability becomes particularly important if local authorities implement policies which will affect not only freight vehicles but also citizens in general such as congestion charging. Congestion charging was accepted in Stockholm by a public vote. A similar approach was taken in Scotland (Edinburgh) where a referendum was held on the possible implementation of a congestion charge, but it was rejected. A Swedish interviewee commented: "Freight has not been an issue for the public but the mobility and what we do on street level is more of an issue for the public acceptance. When it comes to policies like congestion charging, it is really important to get public acceptance on that."

In addition, public acceptability matters for the local authorities because it has a direct impact on local politics and governance. The lack of public acceptability may have adverse impact on the accountability of elected decision-makers as acknowledged by the interviewees. One English interviewee commented that "It is absolutely vital to have the local population on board. Ultimately these are political decisions and politicians are elected. They have to satisfy their communities and we have to tell a story that persuades the voters it is the right thing to do." Similarly, from Scotland: "All of our policies need to be publicly acceptable. Decision-making bodies, local authorities, [regional transport authorities] are all elected and therefore have to be accountable to the public." The local authorities establish consultation processes. Transport plans and planned policies go under different forms of public evaluation to obtain feedback from different parties before they are officially implemented. Consultation processes consist of several steps. Local authorities send out questionnaires to citizens to obtain their opinions concerning policy measure(s) that they plan to implement. Later, local authorities identify the policies and roadmaps for implementation considering the feedback.

4.5 Summary

This chapter has presented the findings from the study which has been done with the local authorities in 11 cities from Scotland, England and Sweden. The eleven case studies included the city councils/the municipalities, the regional transport partnerships, and the combined authorities from Glasgow, Edinburgh, Aberdeen, Dundee, Greater Manchester, Birmingham, Bristol, Newcastle-Upon-Tyne, Stockholm, Gothenburg and Malmö. The aim of this study was to investigate how local authorities seek and select the UFT specific policy measures. In order to achieve the aim, this study investigated first whether local authorities can successfully establish a link between high-level policy goals and on-the-ground policy measures. Second, the case studies have been used to investigate how policy context, resource availability and the need for legitimacy influence how local authorities seek and select UFT specific policies.

The findings have revealed that the case cities have the same high-level goals and in most cases the policy goals are not broken down into clear objectives that relate to UFT. The policy measures in place are chosen from a pool of common measures (primarily access restrictions such as time windows and weight restrictions), but without monitored targets that determine whether they are achieving the policy goals and objectives, if any. It has been identified that there is a lack of strategic approach to setting and reviewing the policy measures according to achieving specific policy goals. The lack of resources contributes to the lack of strategy because local authorities do not have dedicated UFT personnel who can focus on problems and develop mitigation strategies. Public acceptability has been identified as a challenge to implement policy measures such as parking restrictions, congestion charge and LEZ. The act of other public authorities such as governments and national transport authorities has been identified as one of the key influencing factors in choosing and implementing some of the policy measures. The cities, where there is a direct influence of national legislations, can implement policy measures to regulate UFT extensively.

The findings also showed that some cities make project applications in order to create resources for the implementation of UFT policy measures. Collaboration with internal and external parties enable local authorities to establish better links between high-level policy goals and on-the ground policy measures because they can communicate the impact of non-freight policies (e.g. pedestrianisation) on freight movements. Also, departments can work on projects, which are concerned with landuse planning, in order to bring in essential decisions related to freight transport as early as possible. Working in close collaboration with external stakeholders such as local businesses and LSPs can help local authorities in identifying UFT specific objectives and choosing policy measures accordingly. Collaboration with external stakeholders help local authorities to create resources to focus on UFT. These resources can come in many forms, for instance, local authorities can increase opportunities for learning from and collaborating with the private sector. Dedicated personnel for UFT are essential in order to achieve collaboration, and to provide a clear point of contact, knowledge development and policy champion to pursue UFT goals.

CHAPTER 5 : SUPPORTING URBAN CONSOLIDATION CENTRES WITH LOCAL TRANSPORT POLICIES

5.1 Introduction

This chapter presents the findings from two qualitative case studies. 23 interviews have been completed to investigate two different UCC projects in Scotland and Sweden. The aim is to explore not only which policy measures are most successful but particularly the interrelation between the supportive measures and the UCC development process.

This chapter is structured as follows: Section 5.2 presents the descriptive analysis of the data, which is collected through the interviews, in four categories. These categories are (I) the challenges of the project development, (II) stakeholder collaboration in the UCC projects, (III) the use of supporting policy measures, and (IV) the service offerings in the UCCs. Section 5.3 presents the cross-case analysis in using the same categories. Finally, Section 5.4 concludes with a brief summary of the chapter.

5.2 Descriptive analysis of the case study data

5.2.1 Gothenburg, Sweden

5.2.1.1 Case background

The UCC is a subproject under the following two projects: Sendsmart funded by a national funding body between September 2012 and September 2014 and SMARTSET co-funded by the Intelligent Energy – Europe II Programme (IEE II) between May 2013 and April 2016. The aim of the Sendsmart project was to develop sustainable solutions for freight transport in Gothenburg by enabling (i) collaboration and information sharing between public and private actors, (ii) using IT and relevant technology to increase road safety and decrease the environmental impact of freight operations and (iii) implementing policies and incentives for freight consolidation in

order to achieve increased fill rates, reduced congestion and increased coordination (Lindholm 2014). The UCC was involved in SMARTSET in order to expand freight consolidation in the city and to develop a financially viable business model, which can be replicable in Gothenburg as well as in other European cities (Ablasser et al. 2016).

The UCC aims to reduce the amount of freight traffic during peak hours in a particular geographical area and to decrease the interference between freight vehicles and pedestrians as well as cyclists. The UCC in Gothenburg plays a crucial role as a platform that enables collaboration between the local authority, private companies, research institutes and the association of real estate owners and merchants, called Innerstaden. The UCC is owned by Innerstaden and operated by a local courier. Innerstaden is a company owned by the Buyers and Real Estate Owners Association (Köpmannaförbundet och Fastighetsägarna GFR in Swedish). Two logistics companies are the customers of the UCC, which send a part of their parcels through the UCC to the final receivers. The UCC operates for the retailers located in an area called Domkyrkoplan in the inner city of Gothenburg. The retailers located in this area specialise in clothing, footwear, food (e.g., restaurants, cafes), grocery and other consumer goods. The UCC provides the delivery service to the retailers in the area except the ones that are specialised in food and perishable goods.

The UCC uses three electric cars with trailers and two electric cargo bikes to make its deliveries. They deliver and pick up 500 packages to/from approximately 200 shops on average every day. The development process of the UCC consisted of three stages: concept, development and establishment. The concept stage started in 2012 by establishing a pilot study between 2012 and 2013 with a small number of shops. At this stage, the UCC was funded by Sendsmart, the local authority and Innerstaden. The development phase took place between 2014 and 2016. The stakeholders focused on increasing the number of users and started to develop value-adding activities during this stage. The local authorities made an agreement with an international haulier and the national mail service to transport some parts of their deliveries through the UCC. At the end of this phase, the UCC started to fund itself by 80% and 20% was obtained from the local authority. The UCC obtains its revenue from its users and from the advertisements that are shown on the vehicles. The establishment phase started in 2017

as the final stage of the development. The UCC aims to serve all businesses in the area and they are planning to become a fully commercial business.

5.2.1.2 Challenges

The most common challenges were collaboration, finance, delivery schedules and the lack of technology. Collaboration between the stakeholders was mentioned on multiple occasions but this emerged once the project was operational. Lack of communication, engagement with the businesses, establishing a clear structure for sharing costs and operational risks, and losing the direct contact with the end customer due to using the UCC are the main points raised by the stakeholders. The stakeholders experienced financial challenges during both development and operational phases of the project. Unwillingness to pay for using the UCC, small number of logistics operators using the UCC, extra costs arising due to extra handling at the UCC and lack of demand are the main financial challenges that the stakeholders experienced. Even though the owner of the UCC and the local authority have solved the challenges concerning insufficient demand gradually, the businesses are hesitant if they would continue using the UCC when they need to pay for the last mile shipment. Regarding delivery schedules, the businesses mentioned that either they could not receive their deliveries as early as they used to, or they do not know when the vehicles will arrive during the day.

Moreover, as the number of users and the volume has increased, tracking and tracing became problematic. The operator and the local authority stated that the lack of the use of information technology constrained the ability of obtaining more customers, the latter commenting that: "If we are going to work with more transport operators, we need one system which can handle different packages from different operators." Similarly, the operator discussed the challenge of scanning parcels: First, we started with a single hand scanner for both of our customers. With one computer, it is very difficult to do that. We are working on now, but we have not found a solution yet. Now we have one scanner for each customer." The lack of information system causes complaints raised by buyers of some online items, as they cannot track their items, as stated by one retailer: "If we would like to track a parcel, we put in the tracking number and it looks like it has been delivered but it has been delivered to the UCC not to us. We cannot track it all the way and our customers cannot either because

they can see it when the parcel only arrives at the facilities of the logistics service provider."

Some other challenges were specific to some stakeholders. Some of the businesses that the UCC serve have high-value products such as high-value accessories. These businesses are concerned with damages that may occur to their products as a result of extra handling. They also mentioned that the design of the vehicles should be improved in order to ensure the protection of the goods. The operator raised the issue that it becomes problematic to find a suitable place to run their operations as their operational volume increases. One of the users of the UCC is an international freight operator. They use the UCC for a part of their deliveries, and they want to increase the volume of the goods shipped through the UCC; however, the small scale of the operator was a constraint. The scale of the operator and the profiles of the users and the customers do not lead to implementing value-adding operations in order to generate revenue. The local authority also mentioned the lack of more value-added activities as a challenge to further growth.

5.2.1.3 Stakeholder collaboration

While some collaboration challenges emerged later, in fact collaboration played a positive role during the development of the UCC, in which the local authority provided supportive policies as well as financial subsidy. The interviewee from the local authority mentioned that they aim to become a role model to incentivise more sustainable solutions by other freight operator and businesses in the city: "We, as the local authority, want logistics service providers operating in the city to come with two principles; first, it should be clean vehicles of course preferably electric ones and we want them to provide consolidation services that it is possible for other transport companies to use." The local authority also considers building knowledge about freight and its impacts on the economy as well as the environment can be realised through collaboration with other public and private stakeholders. Therefore, the local authority prioritises involvement in national and international projects.

The UCC started in the context of a project funded by a national authority, which initiated a platform for the stakeholders to work together. The local authority focused on some of the big logistics companies instead of individual businesses with lower volumes to establish their customer base. This large LSP provided the required amount of freight to start operations. In order to communicate with the businesses in the area, the project involved the association of real estate owners and businesses, which had a key role to include the shops located in the area in the UCC. Another strong aspect of the UCC was to involve a local transport company, which is familiar with the city, the aforementioned area and the types of businesses. Later, the local authority provided its support for the UCC by implementing supportive policies, exempting UCC users in some cases from many of the existing transport policies in the area, such as pedestrianised areas, walking speed zones, time window restrictions and weight restrictions. The electric vehicles and the bikes used by the UCC are exempt from all the restrictions. The stakeholders continue to work together to help the UCC to become a fully commercial business.

5.2.1.4 Supporting policies

Time window restrictions (combined with weight restrictions) are in place in the area that the UCC serves and most of the area is pedestrianised. Walking speed zones (where vehicles must drive at walking speed) are in action in parts of the area that are not pedestrianised. The operator mentioned that these restrictions helped them to increase the use of the UCC as the vehicles used by the UCC are exempt from some of the restrictions in the area such as time window restrictions as well as the weight restrictions. However, one of the users of the UCC mentioned that even though they ship part of their goods through the UCC, they still need to visit certain areas in the city to deliver palletised or heavy items and the current time window and weight related restrictions constrain these operations.

There are contradicting responses across the stakeholders for the policies that should be implemented in the near future. One of the interviewees mentioned that HGVs should be allowed on the roads during out-of-hours for better capacity utilization. The same interviewee also mentioned that the local authorities should start certification programs instead of implementing restrictions for particular vehicles. On the other hand, the municipality mentioned that time windows for HGVs and LGVs should be extended in order to reduce congestion and provide more space for other road users. Some of the businesses were concerned with congestion problems in the areas where freight vehicles are allowed to enter and according to one of the businesses, there is a need for parking regulations in order to avoid congestion.

5.2.1.5 Service offerings

Businesses involved in e-commerce mentioned that flexibility in deliveries and pickups provided strong motivations to keep working with the UCC, although one business complained that deliveries to their store were not as well planned as before. The stakeholders also mentioned the importance of using electric vehicles as it provides environmental benefits by reducing emissions.

5.2.2 Perth, Scotland

5.2.2.1 Case background

The project initially focused on implementing a consolidation centre to serve two Scottish cities in close proximity, Perth and Dundee. In both cities, improving the air quality was the primary driver for the project. Dundee opted out of the project after they revised their policy plans concerning air quality and freight. The idea of the consolidation centre in Perth was driven also by the need for reducing congestion and enhancing road safety. The project started as a result of the Air Quality Grant that Perth & Kinross City Council obtained in 2010. The city council in Perth started to take actions to mitigate the problems concerning the air quality first by declaring Air Quality Management Areas in Perth. Later the city council developed an action plan to mitigate the air quality related problems. One of the actions was to investigate potential policies to achieve the objectives of the plan.

The consultation process identified a UCC as the most favourable solution. However, the city council did not have the expertise to work on freight consolidation and brought the regional transport partnership (TACTRAN) on board to do the further investigations. At the same time, the city council hired consultants funded by the grant obtained from the Scottish government. The consultants helped TACTRAN to collect information about the retailers in the area and to complete traffic modelling in order to see the outcome of consolidation activities and low emission vehicles (TACTRAN 2010). Based on the findings from a survey of retailers, TACTRAN and the city council decided that the UCC needed to target small and medium sized retailers, which receive a larger number of small deliveries. They wanted to consider only non-perishable goods, because they do not require specific infrastructure and systems in the UCC. Value-added services such as waste collection, off-site storage and pre-retailing services were also considered to create revenue streams for the UCC. A single retailer in Perth and Dundee was receiving 5.5 and 4.5 deliveries per week respectively. Based on the number of retailers and the average weekly deliveries, the models estimated that 24 vehicles would use the UCC against 96 vehicles delivering directly to retailers in Perth, with Dundee deliveries showing 28 UCC deliveries and 132 direct to customers.

In Perth, 24 vehicles would be replaced by a single electric vehicle, which would make 3 rounds of deliveries. In Dundee, 28 vehicles would be replaced by a single electric vehicle, which would make 4 rounds of deliveries. TACTRAN started the tendering process after traffic models showed positive effects of the UCC such as 19% overall emissions reduction using electric vehicles. The city council prepared the contracts for the tendering process. Two logistics companies initially showed interest in operating the UCC but later withdrew because they found the project not feasible. The tendering processes was then terminated.

In the very beginning, the public stakeholders did not intend to provide public subsidies at any stage of the development. However, they changed their strategy after the failed tendering process. Shortly after, TACTRAN was involved in an EU project called LaMilo in 2014 and TACTRAN decided to fund the UCC project for 18 months during its trial period through the project and the Air Quality Grant. During the trial, retailers could have joined the scheme without paying fees. The management and the UCC was planned to be assigned to a single logistics operator and the potential operator would pay some of the costs (e.g. building, rent and workforce). Electric vehicles were also considered to operate between the UCC and the delivery points.

After the UCC was included in LaMilo, TACTRAN organised events to attract the attention of the retailers and the businesses in town. However, there was no interest from the private sector. Later, a real estate company offered a social enterprise model, where the UCC would be used to consolidate and distribute the city council's stationery items in Dundee using electric vehicles. According to the principles of the social enterprise model, the revenue should be paid back to the community. Eventually this project was also terminated due to problems with the stationery suppliers, their existing contracts and the lack of support from the local authority in Dundee.

5.2.2.2 Challenges

The biggest challenge was the lack of interest from a suitable logistics operator to run the UCC caused by financial constraints and the lack of collaboration among stakeholders. The financial constraints were the lack of customer base, the cost of adding one more segment to supply chains, and the cost of extra handling for goods that are already consolidated. Thus, without subsidy, the project could not provide an advantageous pricing scheme to establish a enough customer base. As a part of the project, the stakeholders tried to establish a business model and then identify a private freight operator, which would undertake the required investments and receive the revenue. However, the planned business model was not able to clarify key elements such as the particular property for locating the UCC, the ownership and the use of low emission vehicles.

Political barriers were another significant challenge. The project could not obtain financial support from public authorities such as the local authority and the national government because freight transport and related air quality concerns were not high on national and local agendas at the time when the project was on the table. The local authority mentioned: *"I think things are changing with regards to the air quality side of things. People are starting to take on board that air quality has health hazards; it is a major problem within our cities. I think this is one of the main points that air quality was not in the political agenda as it is now in the last couple of years."* In terms of collaboration, the regional transport partnership TACTRAN was the main driving force behind the project with some help from the local authority during earlier stages of the development. Despite the initiatives to bring potential users to the table at earlier stages, the lack of contact with local businesses was an ongoing challenge that ultimately could not produce a customer base.

5.2.2.3 Stakeholder collaboration

Collaboration was one of the missing links in this UCC project. TACTRAN attempted at various times to trigger collaboration in the project through different channels, such as including it in an EU project. However, the potential freight operator ended their agreement before the trial started. Some of the stakeholders stressed the importance of collaborating with local businesses, which were mostly small and medium enterprises: "retailers that are receiving limited number of deliveries per day through the parcels delivery system were what we were aiming at." Some potential users were actually concerned about the development, one logistics provider commenting: "I do not know if I would like to be involved actually. I would say if there was a consolidation centre it's probably more likely take business away from my business here unless actually, I was physically involved with it in terms of investment or moved my business to the consolidation centre." After the unsuccessful tendering process, TACTRAN had various attempts in order to continue with the implementation of the project. The UCC project has become the part of the EU projects and TACTRAN wanted to initiate the involvement of various stakeholders through this project but there was no interest from the private actors including the retailers and the businesses. The social enterprise project had to end due to the lack of support and the collaboration from the local authorities in Dundee.

5.2.2.4 Supporting policies

Transport policies at the local, regional and national levels have a limited scope concerning UFT in Scotland. National level documents have provided the information concerning general freight issues. The local authorities in Perth and Dundee have objectives to improve the efficiency of freight transport systems in their cities. However, there is a lack of understanding of UFT issues among local planners (TACTRAN, 2010). In addition, the RTS included some recommendations concerning how to develop UFT in the cities such as establishing a FQP and identifying cost effective freight policies. Moreover, when TACTRAN changed the scope of the project from being a commercial UCC to be a social enterprise, which was supposed to work for goods deliveries for Dundee's city council, the role of public authorities had the opposite effect during the development stage. The city council in Dundee did not support the project due to financial constraints.

The interviewees representing freight operators and retailers mentioned that the local authority should remove the ban on nighttime deliveries and enable freight operators to retime their deliveries during out-of-hours or during the night. They also complained that existing parking enforcements compromise LUBs when non-freight vehicles park on them illegally, and that additionally they would like more designated bays. The majority of private actors do not favour policies that implement restrictions and pricing schemes (e.g. congestion charge). TACTRAN and the local authority recommended some policies which they hoped might incentivise users and freight operators to utilise the UCC, such as the development of delivery and service plans, parking privileges for electric vehicles and enabling OHD. The feasibility report also explicitly raised the possibility of considering options such as tighter restrictions with respect to time, size and route, exemptions from restrictions for certain delivery vehicles, promoting fleer recognition schemes and reduced business rates (local tax for businesses) for potential users of the UCC (TACTRAN 2010).

5.2.2.5 Service offerings

TACTRAN focused on a UCC concept that would cover the deliveries for local retailers, mainly the ones which sell non-perishable goods. During feasibility studies (TACTRAN, 2010), TACTRAN drew attention to the importance of offering additional services in order to provide additional revenues, which could help the UCC to become financially viable as quick as possible. The feasibility report proposed service offerings that would be particularly useful for retailers such as collection of waste and recyclable materials, pre-retailing services (e.g. tagging, barcoding, preparing items for display) and providing storage space. The discussions about the service offerings were not taken further as the project terminated at an early stage. If the project had gone ahead, it was planned to use electric vehicles for deliveries, which would have been another potentially attractive service.

5.3 Cross-case Analysis

Table 5.1 summarises the main findings of the study. The following sub-sections will briefly highlight the key findings in the cross-case analysis and the discussion section will discuss them in the context of previous research.

5.3.1 Challenges

The Perth case experienced the major challenges of finance, collaboration and location early, which is why it was unsuccessful, whereas these were raised only later during the operational phase of the Gothenburg case. It overcame these challenges in the development phase through start-up funding and an ongoing collaboration, but once the UCC was operational, maintaining funding became harder. In addition, the location became less attractive due to changing demand and operational challenges. A more complex supply chain weakened the collaboration in which the retailer, the operator and the local authority occasionally experienced problems in communication.

The operational challenges are important to highlight as they are the cause of the reluctance of LSPs to use UCCs and lead to the need for collaboration, service offerings and supportive policies discussed in the next sections. Extra handling at the UCC was considered a challenge by the LSPs outsourcing their last mile deliveries to the UCC, firstly because of the obvious fact of needing to pay to the UCC for each package that the UCC delivers: "We know that if you handle goods or parcels one more time, it will cost some money . . . but sometimes if you want to develop things you need to invest." Another important issue was losing direct contact with customers, which can affect the service levels of LSPs, as they will lose control over the quality and timeliness of deliveries. The operator commented: "We have some service problems with some of the receivers... Earlier you were A and received your product at 10 am but now you are B receiving products at 2 pm and that is not positive for the company." The Gothenburg UCC was able to provide some operational benefits by decreasing the number of vehicles that providers were sending to the area as they make their deliveries to the UCC using bigger trucks instead of sending multiple smaller trucks to the area, where time window and weight restrictions are in place.

| Influences | Gothenburg | Perth | |
|---|-----------------------------|------------------------------|-------------------|
| Challenges identified in the cases | Financial viability | Yes (only during operational | Yes |
| | | rather than development | |
| (Browne et al. 2005; Allen et al. 2014; Kin et | | phase) | |
| al. 2017; Johansson and Björklund 2017; | Operations | Yes | No |
| Lagorio, Pinto, and Golini 2016) | Lack of collaboration | Yes (only during operational | Yes |
| | | rather than development | |
| | | phase) | |
| | Lack of political support | No | Yes |
| | Location and infrastructure | Yes (only during operational | Yes |
| | | rather than development | |
| | | phase) | |
| Stakeholder collaboration factors identified in | Need for public action | Yes | Yes |
| the cases | Awareness of barriers | Yes | Yes |
| | Build on large players | Yes | No (attempted but |
| (van Duin et al. 2018) | | | not achieved) |
| | Empower small players | Yes | No |
| Service offerings from each UCC | Electric vehicles | Yes | Yes (intended) |
| | Additional stockholding | No | Yes (intended) |
| (Browne, Allen and Leonardi 2011; Paddeu, | Pre-retailing services | No | Yes (intended) |
| 2017; Johansson and Björklund 2017; | Waste management & | No | Yes (intended) |
| Björklund, Abrahamsson, and Johansson | recycling | | |
| 2017; Gammelgaard, Andersen, and Figueroa | E-commerce services | Yes | No |
| 2017) | Using vehicles as the venue | Yes | No |
| | for advertisement | | |

Table 5.1 Summary of the main findings from each case study

| | | Information system enabling | Yes (not currently but in | No |
|---------------------------|--------------------|-----------------------------|---------------------------|-------------------|
| | | tracking and tracing | progress) | |
| | | Customised delivery times | Yes (but only for some | No |
| | | and dates | deliveries, not all) | |
| Supportive policies | Financial support | Start-up | Yes | No |
| applied in each case | | Structural | Yes | No (attempted but |
| | | | | not achieved) |
| (Panero, Shin, and Lopez | | Indirect | No | Yes |
| 2011; Lebeau et al. 2017) | Direct regulatory | One compulsory UCC | No | No |
| | support | License granted to | No | No |
| | | transporters | | |
| | | Favourable measures to UCC | Yes | Yes (intended) |
| | | operator (including OHD) | | |
| | Indirect | Time windows | Yes | Yes |
| | regulatory support | Weight restrictions | Yes | No |
| | | Size restrictions | No | No |
| | | EURO vehicle norms | Yes | No |
| | | Age of the vehicles | Yes | No |
| | | Urban toll | Yes | No |

Notes: The Perth case was never operational, so the service offerings and supportive policies listed are those that were intended

5.3.2 Stakeholder collaboration

In both cases, the projects were initiated by local authorities, which obtained some funding from national and international sources, and then identified the potential stakeholders for the UCC. Yet the role of collaboration was quite different between the case studies. The lack of collaboration is one of the primary reasons why the UCC in Perth was terminated. The project went through stages where different business models were discussed but they did not develop further as each model lacked support from each of the three stakeholder groups, but particularly from LSPs. In contrast, the Gothenburg case showed evidence of all of the four collaboration factors. The local authority initiated the proposal and then approached local businesses in order to discuss the potential barriers that the project may encounter and the particular requirements of these businesses.

The project developers negotiated with large LSPs to become users of the UCC. Finally, the local authority approached a small sized local courier to hire them as the operator of the UCC. In this way, the local authority has created a job opportunity for a small-scale business, which does have experience in working with the local businesses and is familiar with the area. The UCC in Perth began with public action but did not display sufficient awareness of the barriers to using a UCC and thus was not able to attract either users or an operator. After the project was terminated, the public authorities in Perth highlighted the importance of establishing collaboration with local LSPs instead of large national and international companies while searching for an operator for the UCC.

Nevertheless, it is important to note that, even in the successful case, in fact the private operators (the users) were not initially eager to join the project. The involvement of the public sector was particularly influential by providing financial support and enforcing particular restrictions in the areas, and also the evolution of the local transport policies after the implementation of the UCC. Thus, the evolution of UFT policy worked in conjunction with the stakeholder collaboration. On the other hand, in the Perth case the public stakeholder was unable to attract interest on behalf of the private sector, which could be partly because of their lack of introducing supportive policies but also due to limited collaboration between the public and private stakeholders when it comes to dealing with UFT related issues in Scotland. The comment quoted earlier from a Scottish LSP which viewed the UCC as a potential threat gives on indication of this challenge.

5.3.3 Supporting policies

The Table 5.1 shows some clear differences between the successful and unsuccessful case. Clearly the start-up finance was absolutely essential, reflecting the challenges of attracting paying users. To avoid increasing costs for users and to attract an operator, the Swedish project was subsidised by public money beginning from the early stages of the project and the support was decreased gradually as the UCC started to generate revenues. However, the UCC will continue to receive structural subsidy until it becomes a fully commercial business. Indirect financial support was available in Perth via an EU-funded research project that paid for the feasibility studies. Direct regulatory support was provided (or planned) in both cases via favourable measures to the UCC operator.

Another key difference was in the indirect regulatory support, which is where the list of supportive or other UFT policies can be used in conjunction with the UFT. The UCC in Perth focused on the "carrot" of attracting paying customers but without the "stick" of restrictive UFT policies that would effectively force them to use the UCC to avoid them. This was partly due to political challenges: "it is just very difficult to get the politicians to support it and local newspapers will latch on something like that and make a big story out of that which says council is trying to impose restrictions."

It must be remembered that such restrictions are not necessarily directly for the UCC but are sometimes put in place regardless. In the Gothenburg case, the local authority implemented time window restrictions around Domkyrkoplan before the UCC has been established. The purpose of the restrictions was not to support the UCC directly but to create a pedestrianised area to increase the road safety mainly for pedestrians. After the UCC started to operate, the local authority granted access permissions for electric vehicles and bikes at any time of the day (e.g. favourable measures to the operators). Later, the local authority continued to implement other policies in combination with time restrictions. Since February 2017, weight restrictions are in place, where vehicles above 3.5 tonnes are only allowed to enter the area until 10 am.

The municipality aims to increase the number of policies gradually until they minimise the number of personal and commercial vehicles in the area. The local authority in Gothenburg also implemented environmental zones (e.g. controlling age of the vehicles) and congestion charge (e.g. urban toll) to regulate the flow of general traffic, which may indirectly encourage freight companies and receivers to use the UCC. So, in this case it is the fact that the local authority in Gothenburg is proactive about reducing traffic in the city centre that created an environment where the UCC could be attractive, whereas UFT has a lower priority in public policy in Scotland generally and so in Perth such policies would have had to be newly implemented. This supports the importance of understand the public authority role and linking the wider UFT policy setting with the individual UCC development.

5.3.4 Service offerings

Both UCCs offered (or planned) the use of electric vehicles and cargo bikes, but, while the unsuccessful Perth case planned traditional stockholding and pre-retailing services, the Gothenburg case did not find interest from users in these services. This is because their customers are the LSPs rather than the receiving retailers. Instead, they looked towards the use of IT, offering e-commerce now and developing tracking and tracing. The latter is particularly important because otherwise the retailers cannot track their goods after they are delivered at the UCC because they are no longer in the system of the logistics provider. Here the different information systems used by operators was a challenge, as noted by the UCC operator in the case study description above. They were able to raise revenue from using vehicles as the venue for advertisement.

5.4 Summary

This study has explored not only which policy measures are most successful but particularly the interrelation between the supportive measures and the UCC development process. Local authorities seek to address problems caused by UFT by applying various policy measures. The most popular policy measures found were lowcost policy measures such as access restrictions. However, initiatives requiring longterm partnerships such as UCCs were less popular. The implementation of policy measures such as public-led UCCs requires local authorities to have resources and to acquire different set of skills. Lindholm and Blinge (2014) advised that local authorities need to develop a certain degree of knowledge concerning UFT and related interest groups; otherwise, local transport policies may become counterproductive.

The UFT policy measures work in conjunction with stakeholder collaboration to support the development of public-led UCCs. The collaborative setting should be established by the local authority. Collaboration becomes a challenge when there are many stakeholders with diverse goals. Local authorities want both to support existing businesses and to attract new businesses while at the same time protecting the environment and quality of life for citizens, while LSPs and retailers focus on cost reduction and the reliability and flexibility of their delivery operations. In order to protect these priorities, they are reluctant to use UCCs. One of the significant challenges with UCCs is their inability to attract sufficient users, which limits their financial viability. The findings showed that start-up finance is essential, reflecting the challenges of attracting paying users. To avoid increasing costs for users and to attract an operator, projects need to be subsidised beginning from the early stages of the project and the support can be decreased gradually as the UCC started to generate revenues.

The findings relating to the supportive policy measures have showed that UFT policies such as time window restrictions can support successful UCCs. Local authorities may not implement restrictions directly for UCCs, but they can be implemented to regulate general traffic. Local authorities then support the use of UCCs via granted access permissions for electric vehicles and bikes, which are used by UCCs. Local authorities aim to increase the number of policies gradually until they minimise the number of personal and commercial vehicles. Using other policy measures require local authorities to be proactive about reducing traffic in the city centres and to create an environment where UCCs could be attractive.

It is crucial for public-led projects to identify a potential operator and potential users for the UCC and ensure that they will not be financially penalised for using it. Therefore, the start-up and structural finance were absolutely essential to the successful case, supported by favourable measures to the UCC operator. Also, local authorities should be able to show LSPs that they can obtain operational benefits by outsourcing their last mile deliveries, if they want to attract more users. Implementing supportive policy measures work depending on various other factors. Public authorities need to build a collaborative UFT policy environment before attempting a UCC development. This involves designing supportive policies for the city in general and not just for the UCC, but also committing to financially support the UCC over at least the medium term, allowing time for the system to mature and collaborative service offerings to be developed.

CHAPTER 6 : THE RETAILER PERSPECTIVE ON THE POTENTIAL FOR USING URBAN CONSOLIDATION CENTRES

6.1 Introduction

This chapter presents the results from the interviews with 30 retailers located in Edinburgh City. The retailers are independent shops, which sell non-perishable consumer goods such as footwear, books and clothing. This study investigates the retailers' perceptions on using UCCs with respect to other local transport policies and the level of service offered in UCCs.

This chapter consists of five main sections presenting a descriptive analysis of the data which have been collected through the interviews. Section 6.2 provides an overview of spatial distribution of retailers, logistics operations of the retailers, and finally the operational challenges due to current delivery methods. Section 6.3 presents the difficulties that the retailers experience in their deliveries due to local transport policy measures. Section 6.4 present the retailers' perspectives on choosing to use UCCs for their deliveries. Section 6.5. presents the retailers' responses on the relationship with the public authorities and the impact of specific policy measures, both which affect the willingness of retailers to use a UCC. Section 6.6 discusses the impact of service offerings on the willingness of the retailers to use a UCC. Finally, Section 6.7 concludes with a brief summary of the chapter.

6.2 Characteristics and logistics operations of the retailers

This section is divided into three sub-sections to present the findings from the interviews with the retailers. The basic and the most essential information are disseminated regarding spatial distribution of the retailers, logistics operations of the retailers, and the challenges that they experience while receiving deliveries in their premises.

6.2.1 Spatial distribution of the retailers

The retailers are located in both streets near to the city centre as well as the other urban centres such as Stockbridge, Bruntsfield/Morningside, Tollcross, Old Town (a mix of Jeffrey Street, St Mary's Street, and Canongate, West Bow, and Greyfriars), and Thistle Street. These locations share similar features. The independent retailers are heavily located in these areas. The areas are characterised by high volume vehicle traffic and they are either located along main arterials routes or located closer to other arterial routes.

16 out of the 30 retailers are located in Bruntsfield/Morningside. Bruntsfield/Morningside is one of Edinburgh's nine town centres. A wide range of activities from shopping to leisure takes place in the area. The town centre is located along a main arterial route, which makes the town centre an ideal location for living and businesses. The individual retailers are highly agglomerated in this area. Tollcross is a street which is closely located to Bruntsfield. There is only one retailer in the sample that is located in Tollcross. Tollcross also accommodates a high number of independent retailers, which are mostly restaurants, cafes, and other service-dominant retailers such as tailors, and barbers.

The next set of retailers are located in another town centre, which is called Stockbridge. Stockbridge is located north of the city centre. Four retailers have participated the interviews from Stockbridge. There is a mix of retailing outlets including cafes, restaurants, gift shops, furniture shops, and clothing shops. The area tends to have a heavy traffic during the weekdays in rush hours. Another retailer is located in Thistle Street. The main difference between this location and the other locations is that Thistle Street is a pedestrianised street. Thistle Street is the part of the New Town of Edinburgh City. In this thesis, Jeffrey Street, St Mary's Street, Canongate, West Bow and Greyfriars are presented as the parts of Old Town of Edinburgh as they are in and/or close proximity to the Old Town. Five of the retailers in the sample are located on Jeffrey Street, St Mary's Street, and Canongate, which comprise the main eastern section of the Old Town. There are three retailers in the sample, which are in West Bow and Greyfriars. Greyfriars is located in an area where multiple arterial roads are crossing, and the volume of the traffic is particularly high.

6.2.2 Logistics operations of the retailers

The retailers in the sample have similar supply chain and logistics operations. Both centralised and decentralised supply chain structures were identified. The retailers with decentralised supply chains manage their order processes and inventories individually. The retailers with centralised supply chains have a central unit that manages order processing and inventory management for them. Two of the retailers have centralised supply chains and their orders are stored and delivered from their own warehouses. Three retailers have decentralised supply chains and they also have their own warehouse, which they use for storage and consolidation purposes. These retailers sell furniture and home accessories. They have similar systems when they their deliveries either in their shops or in their warehouses. Larger items such as sofas or beds are directly sent to their warehouses for assembly. Then, they are delivered to their customers. Smaller items such as rugs, tables and small home accessories are received at their shops. The rest of the retailers has decentralised supply chain networks and they do not have warehouses. They all receive their deliveries in their shops.

The supply process starts when the retailers order products from their suppliers. In all cases, shipments from the suppliers to the premises of the retailers are arranged by their suppliers. The delivery schedules vary amongst the retailers. Most of the retailers in the sample receive their deliveries on a daily basis (at least one delivery per day) or on a weekly basis (2-3 deliveries per week). The rest of the retailers receive their deliveries on a monthly basis (1-2 deliveries per month) or only during a particular period of the year such as only between June and August. The deliveries are made to the shops and to the warehouses by LSPs. Occasionally, suppliers (e.g., artists' paintings, postcards) make the deliveries by themselves. Deliveries arrive from all over the world. LSPs send updates to the retailers about the time of their deliveries via emails or text messages. The deliveries take place during the daytime, and they are scattered throughout the day. Only one of the retailers receives a part of their deliveries during out-of-hours. This particular retailer has an agreement with one of their suppliers to enter the shop to make the deliveries out of business hours.
Table 6.1 summarises the main features of the retailers that were discussed previously (e.g., the types of the retailers, the supply chain design, order frequency, delivery frequency). The names of the retailers are anonymous due to confidentially reasons. Each retailer will be given a number and they will be identified via their numbers throughout this chapter.

| Retailer | Type of products | Supply chain design | Delivery frequency | Place of deliveries | Who brings the delivery |
|----------|---------------------------|---|---|------------------------|---|
| 1 | Souvenirs | Decentralised without a warehouse | It varies on a daily basis | The shop | LSPs |
| 2 | Bookshop | Decentralised without a warehouse | Two main deliveries coming every day and 2-3 deliveries per day as an addition. | The shop | LSPs |
| 3 | Toys | Decentralised without a warehouse | At least one delivery per day | The shop | LSPs and suppliers |
| 4 | Clothing & Accessories | Decentralised without a warehouse | 3-4 deliveries every day or every second day | The shop | LSPs |
| 5 | Clothing& Souvenirs | Decentralised without a warehouse | At least 1-2 deliveries on a daily basis | The shop | LSPs and occasionally the owner picks up some of the deliveries from their suppliers |
| 6 | Souvenirs | Decentralised without a warehouse | Two deliveries per month | The shop | LSPs |
| 7 | Clothing & Accessories | Decentralised without a warehouse | At least one delivery and at most 5 deliveries on a weekly basis | The shop | LSPs |
| 8 | Clothing & Accessories | Decentralised without a warehouse | Depending on the season, they receive multiple deliveries every day during high seasons, and they receive no deliveries on low seasons | | LSPs |

Table 6.1 Key logistics features of the retailers

| 9 | Clothing & Accessories | Decentralised without a warehouse | They receive on a daily basis during summer months. They visit trade fairs to replenish their stocks in winter months and these deliveries are made between November and February. From February till summer, they do not receive deliveries. | The shop | LSPs |
|----|---------------------------|---|--|----------------------------------|--------------------|
| 10 | Souvenirs | Decentralised without a warehouse | They receive multiple deliveries every day during summer months and they receive fewer deliveries on a weekly basis for the rest of the year. | The shop | LSPs |
| 11 | Souvenirs | Decentralised without a warehouse | 2-3 deliveries on a weekly basis | The shop | LSPs |
| 12 | Furniture | Decentralised with a warehouse | They receive at least one delivery in their shop (small items) as well as in their warehouse (bigger furniture) | The shop and the warehouse | LSPs and suppliers |
| 13 | Stationery | Decentralised without a warehouse | They receive a single delivery from one of their suppliers on a daily basis (delivered on out-of-hours and supplier has a key to the shop) and they also receive multiple deliveries from other suppliers | The shop | LSPs and suppliers |
| 14 | Clothing & Accessories | Decentralised without a warehouse | Multiple deliveries on a weekly basis | The shop | LSPs |
| 15 | Souvenirs | Decentralised without a warehouse | 1-4 deliveries daily | The shop | LSPs |

| | Clothing & | Decentralised | | | |
|----|-------------|----------------------------|-----------------------------|-----------|------------|
| 16 | | without a | Multiple deliveries daily | The shop | LSPs |
| | Accessories | warehouse | | | |
| | | Decentralised | They receive a number of | | |
| 17 | Souvenirs | without a | deliveries every day. The | The shop | LSPs |
| | | warehouse | number varies daily | | |
| | | | They receive a single | | |
| | | Decentralised | delivery every week. | | |
| 18 | Clothing & | without a | Depending on the season, | Theshop | I SDc |
| 10 | Accessories | | the number of deliveries | The shop | LSFS |
| | | watehouse | can go up to 5 deliveries | | |
| | | | per week. | | |
| | Clothing by | Decentralised | | | |
| 19 | Accessories | without a | Two deliveries per day | The shop | LSPs |
| | Accessories | warehouse | | | |
| | Skateboards | Decentralised | One or two deliveries per | | |
| 20 | & Clothing | without a | day | The shop | LSPs |
| | | warehouse | uay | | |
| | | | There is no pattern on the | | |
| | Souvenirs | | number and frequency of | | |
| | | Decentralised | the deliveries. They | | |
| 21 | | without a warehouse | sometimes receive a single | The shop | LSPs: |
| | | | delivery per day and | | |
| | | | sometimes a single delivery | | |
| | | | per week | | |
| | | Centralised | At least one delivery | | Their own |
| 22 | Souvenirs | with a | through Royal Mail and | The shop | delivery |
| | bouvening | warehouse | their own vehicles delivers | The shop | vans and |
| | | , al ello use | on the weekends | | Royal Mail |
| | | | They receive three | | |
| | Clothing & | Centralised | deliveries a week on low | The shop | |
| 23 | Accessories | with a | seasons and the number of | and the | LSPs |
| | | warehouse | deliveries can go up to 15 | warehouse | |
| | | | during high seasons | | |
| | | | Depending on the season, | | |
| | | venirs without a warehouse | they receive up to 3 | | |
| 24 | Souvenirs | | deliveries per day during | The shop | LSPs |
| | | | busy periods and they may | P | ** |
| | | | not receive any deliveries | | |
| | | | during low seasons. | | |

| 25 | Souvenirs | Decentralised without a warehouse | A delivery from one of their suppliers every week regularly. Other than this, the frequency of deliveries varies and there is no fixed schedule. | The shop | LSPs and their suppliers |
|----|------------|---|--|----------------------------------|--------------------------------|
| 26 | Stationery | Decentralised without a warehouse | Depending on their order cycle, they receive up to 5 deliveries every week until the end of each month and they do not receive any deliveries at the end of the month. | The shop | LSPs |
| 27 | Souvenirs | Decentralised without a warehouse | They receive 3-4 deliveries per day. | The shop | LSPs |
| 28 | Furniture | Decentralised with a warehouse | Depending on their suppliers, they receive their deliveries both daily as well as weekly basis. | The shop and the warehouse | LSPs and suppliers |
| 29 | Furniture | Decentralised with a warehouse | They receive at least one deliver in their shops (for smaller items) and one delivery in their warehouse (for bigger furniture) | The shop and the warehouse | LSPs and suppliers |
| 30 | Toys | Decentralised without a warehouse | 1-2 deliveries daily | The shop | LSPs |

6.2.3 Operational challenges experienced during the deliveries

The interviews revealed that the retailers experience difficulties when they are receiving their deliveries. Their problems originate from the lack of floor space, inconsistency of the delivery times during holiday seasons, damaged products, location of the shop (in connection with the lack of LUBs), lack of loading/unloading bays, and the pressure due to restrictive transport policies (Table 6.2). The retailers' premises are small in terms of size, and they run out of space quickly when the size of deliveries is bulky. The same problem occurs if all deliveries arrive around the same time. The shop owners struggle if they are working alone in their shops. One of the shops particularly struggle if their deliveries come in wooden pallets as these pallets do not fit in their door. They often need to ask their suppliers about sizing down their packaging or they ask drivers, who make their deliveries, to break down their deliveries into small parcels:

"Sometimes when delivery men are on their own or when they are slightly grumpy, they refuse to do that, or they get really moody about it even though we go out and help them which is not our job, but it is also a lot of the time. But most of our delivery drivers are very friendly and helpful. We always tell our suppliers that we do not accept pallets; sometimes if they are using different delivery companies, it gets forgotten very occasionally [Retailer #26]."

| Challenges | Number of retailers |
|---|------------------------|
| Lack of floor space | 10 |
| Lack of personnel | 9 |
| Pressure due to restrictive transport policies (e.g., time restrictions, parking restrictions and lack of dedicated parking spaces) | 7 |
| Size of deliveries (e.g., bulky, deliveries on pallets) | 5 |
| Damaged products | 5 |
| Inconsistency of the delivery times during holiday seasons | 3 |
| Lack of loading/unloading bays (LUBs) | 3 |
| Health and safety standards of LSPs | 2 |
| Location of the shop (in connection with the lack of LUBs) | 2 |

Table 6.2 Challenges that retailers experience during deliveries

The time around holiday seasons such as Christmas, the retailers experience more problems with their deliveries due to timing issues as one of the retailers mentioned:

"During Christmas like times, if you wait for five boxes in total, two of them would come today and three of them would be delayed and they do not come tomorrow or the next day and you do not know when they would arrive and sometimes you get damaged goods [Retailer #3]."

Damages to the parcels were raised by many retailers; however, they also mentioned that it does not happen often. Parking problems due to restrictions and lack of dedicated spaces for loading and unloading operations were raised by the retailers, which are located near the roads and the areas with high-volume traffic such as Stockbridge, Tollcross, Brunstfield/Morningside, and Greyfriars. The size of the deliveries often becomes problematic when it is combined with parking restrictions:

"If it is a big delivery, if it is a crate or something like that; they will dump it outside on the pavement because of the restrictions and we have to arrange the crates to be collected again and sometimes there is a charge to us. It's just that. Maybe sometimes we don't even get a delivery. We are told that it's attempted to be delivered and maybe this is because couriers are really struggling to find a place during restricted hours [Retailer #5]."

Another retailer added that they often experience problems due to parking restrictions even when they bring parcels with their own vehicles:

"Massive parking problems with the parking. They have to try and stop somewhere else and some of these parcels can be really heavy. The traffic wardens do not understand [Retailer #15]."

The lack of proper LUBs and operational constraints cause problems when the retailers receive their parcels as one of the retailers stated that:

"Occasionally I have a driver who will either phone me saying I am unable to stop anywhere near you, have you got a backdoor, etc. I had a driver last week who parked on the zigzag lines, who came and said I parked illegally is that okay and I said you have to keep an eye on it otherwise they will correct you. I said we are looking at making a LUB or asking the council to make a taxi rank into a LUB, but he actually said that it would not help him because he is not allowed to bring the deliveries across the road due to health and safety reasons because it is a main road [Retailer #13]."

One of the retailers also raised their concerns about health and safety standards of delivery companies as some of LSPs do not bring parcels inside shops. According to one of the retailers, LSPs adopt their operations in a way that deliveries are made without getting affected by the restrictions:

"To be honest, a lot of delivery drivers their times have changed, and they are working longer hours now and we are not closed when they arrive, we are still open. So, I actually do not have any problems. Sometimes we have problems when drivers arrive too early and they put a note through the door. Usually what happen is when you know the driver, he will then come back to you anyway [Retailer #9]. "

Another retailer mentioned that the parking problems and delays in deliveries arise when LSPs are not familiar with the neighbourhoods:

"Sometimes the guys cannot park. Some of the delivery people if they've got particularly big van, the ones that do not come here very often, get the fear because this is a wee, narrow street. But sometimes they will not come along at all or they will say they cannot drop off today, so they will come around with a smaller van. That is really just their knowledge not being complete on where they are delivering to. They do not know the area [Retailer #12]."

6.3 Current difficulties experienced due to existing local transport policies

This section presents the results of the discussion with the retailers about the pros and cons of existing local transport policies. The results derived from the interviews showed that half of the retailers think that their deliveries, their businesses, and visits of their customers are affected by the local transport policies while the other half argue

that the local transport policies do not affect their operation. Therefore, each group will be discussed separately.

6.3.1 Retailers who are not affected by current transport policies

The retailers who are not get affected by local transport policies listed several reasons why local transport policies do not affect them. First of all, it is important to mention that the retailers are located in different parts of the city and local transport policies are implemented differently in all these locations. For instance, yellow lines prohibit cars and vehicles parking on kerbsides; however, freight vehicles are exempted from this rule in some parts of the city. Such circumstances change how retailers perceive a particular transport policy. Some of the retailers have designated LUBs in front of their shops and they argue that restrictive transport policies do not affect them as LSPs can already make their deliveries comfortably. One of the retailers mentioned that:

"...where I am positioned, there are yellow lines outside, and they can stop on yellow lines for loading and unloading so it is actually fine. I would not need more LUBs because they can stop on yellow lines"

and another retailer added that:

"They can come here at any time and park outside so we do not get affected much by time window restrictions; it is a yellow line, and nobody would tell them anything. In addition, couriers are working in a very tight schedule, so they are literally in and out. There is no LUBs because there is usually space there outside [Retailer #4]."

The relationship as well as the familiarity with the parking attendants seems to change their perceptions about restrictive transport policies. According to the retailers, the parking attendants in their neighbourhood are flexible towards loading and unloading vehicles, particularly if the retailers bring parcels with their own vehicles. Parking attendants are flexible toward customer pick-ups also. The retailers in this group think that local transport policies create problems for LSPs and their customers but not for retailers. Therefore, the retailers argue that they would receive their deliveries anyway and as long as their deliveries arrive at their shops, they are not concerned with restrictive transport policies or incentives like UCCs. However, the

same retailers are concerned about the fact that particularly the parking restrictions affect their customers as these restrictions cause people to stop going to the city centres for shopping and they are inclined to go to the shopping malls, where free parking is available. The local authority lifts parking restrictions in certain places in the city on Sundays; so, the public can park for free when they travel to the city centre. However, the retailers object to the relaxation of the restrictions in this way. The main reason is that Sunday is the only day that most of the small and medium size retailers close their shops and therefore they miss a business opportunity when their shops are closed, and potential customers are visiting the city centre.

Parking restrictions are supported by the retailers in this group due to various reasons. Parking restrictions prevent the clutter of delivery vehicles or cars as they have limited time for loading and unloading. In some instances, delivery vehicles close the roads and stop the entire traffic. Another reason is that parking restrictions enable pedestrians to move in a secure environment and do not interfere with the mobility of pedestrians and people with disabilities if there are fewer vehicles parking on kerbsides. Parking restrictions make the jobs easier for LSPs to find parking space if particularly there are no dedicated bays for loading and unloading. The parking restrictions are elevated during the weekends, which was previously mentioned as a disadvantage; however, it becomes an advantage for some of the retailers as their customers can pick up their deliveries from the shops.

6.3.2 Retailers who are affected by current transport policies

The second group involves the retailers that are affected by the existing local transport policies. The discussion with the retailers mostly focused on time window restrictions, parking restrictions, designated LUBs, OHD, pedestrianisation, LEZ and congestion charges. The retailers mentioned that the LSPs deliver parcels in many different places around the city and different time windows are implemented in different places. Therefore, it is challenging for LSPs to provide exact times for deliveries. Previously, the retailers raised issues concerning how not knowing the time of the deliveries causes problems for small and medium size retailers when they plan for their staff. Also, it becomes problematic when deliveries arrive at their shops and there is only a single person working in the shop or if it is the busiest period of the day with customers. Some of the retailers in this group discussed their concerns about the implementation of more restrictions. The same retailers are located next to the busy roads (e.g., Stockbridge, Tollcross, Bruntsfield/Morningside, Greyfriars) and there are time-windowed parking restrictions and loading and unloading restrictions are in place:

"All these restrictions when we can get deliveries, they are all a nightmare. Usually delivery drivers will pull in on the top of the street. If it is restricted in any way, we would have a lot of trouble because there is nowhere else that they can pull in without constant traffic at junctions so that would be an absolute logistical nightmare [Retailer #26]."

Another retailer mentioned that the disadvantages of the restrictive transport policies can be mitigated by adding dedicated bays for loading and unloading operations:

"The availability of LUBs is good because there is one down from the shop and it helps a lot to us. There should be more LUBs. They can park legally, and they are allowed to. If they are offloading continually, they are allowed for 30 minutes. If they are parking on the road, you have to put money into the meter and they only have 5 minutes. LUBs give couriers more time to load and unload [Retailer #29]."

Even though the retailers mentioned that LSPs would be affected by the restrictive transport policies the most, they are also affected by the consequences of the restrictive policies particularly during busy periods:

"The first one, time restrictions. I don't have a problem with that but couriers obviously do because I have collections as well and if I get 50 boxes going in Christmas time, they want to come and collect at 5 pm because that is when their vans are empty but because of the parking restrictions, they are not allowed to stop. If they are taking 50 boxes from me and they cause a problem for me because then I have to stay open until late or the boxes will not be collected [Retailer #3]."

The occupation of dedicated bays for loading and unloading is another problem that indirectly affects the retailers and affects LSPs directly. LUBs are occupied by other vehicles which do not make deliveries but pick up various items from other shops. When it is the case, delivery vehicles cannot find a place to park their vehicles and it may cause delays in deliveries as they are subject to time window restrictions. According to one of the retailers, the lack of LUBs and the occupation of LUBs by other vehicles can cause issues related to road safety and accidents. They raised the issue as:

"For the amount of small businesses, there is not enough LUBs and I have seen some very near accidents when people are trying to reverse into the LUBs because traffic slows down [Retailer #5]."

The restrictive transport policies constrain the retailers when they make deliveries with their own cars and/or vehicles. A similar concern has been raised by the retailers located in different parts of the city:

"In my premises, we have a place on the back of the store which lays empty. I have asked the council 2-3 times if I can buy a permit to park there, the answer is no; it belongs to the residents and they park their cars there."

Another retailer mentioned that:

"I have got a bus stop right outside the shop and there is no flexibility in terms of parking. I got a ticket because I was offloading my own car and some parts of the car was in the bus stop and the rest was in the bay and bay was not working at that time of the night and we got £30 ticket and the parking attendant knew my car; so, no flexibility at all [Retailer #9]."

The retailers who complained about the restrictive transport policies are concerned because the parking restrictions affect their customers more than they affect their delivery operations. In some neighbourhoods, the parking restrictions are in place between certain time windows when customers are heavily visiting the stores:

"Parking restrictions, of course they make sense but for me you cannot park outside at 4:30 pm until 6:30 pm which for us peak time for customers coming in so it is not good for us [Retailer #18]." Edinburgh becomes a city of festivals throughout the year, but mainly during summer. During the time of the festivals, the number of restrictive transport policies are increased. Some of the retailers mentioned that restrictions cause delays in their deliveries as time windows and parking restrictions are extended timewise and spacewise. The retailers who have their own warehouse spaces do not get affected by the restrictions as most of their deliveries are sent to their warehouses and there are available parking facilities and no restrictive transport policies in place.

Pedestrianisation is not a problem for the retailers; however, two retailers (one located in a pedestrianised area and one not) mentioned opposite opinions about the benefits and the disadvantages of pedestrianization. Whilst the retailer in the pedestrianised zone mentioned that they do not benefit from the pedestrianisation as it does not let their customers arrive with their own vehicles:

"I would prefer that this street is not pedestrianised because a lot of our customers will just stop the car for a couple of minutes and run in; but I can also see the benefit of having it pedestrianised. We prefer there is no parking restrictions and in fact more non-residents permit parking because it is very limited where people can actually park. I love pedestrianised areas as a shopper but as a business owner I would prefer customers would be able to get closer in their car [Retailer #7].

"I think increasing in pedestrianised areas definitely here it would be difficult to implement but the difference between the lower end high street and top end of the high street in terms of footfall is chalk and cheese because they are pedestrianised. So, most of the traffic, the foot traffic stays at the top because of that, and the bottom end of the high street really misses out, I think. Of course, because less people are coming to this end, an increase in pedestrianised areas would be more beneficial for us [Retailer #8]."

6.4 Retailers' perspectives on urban consolidation centres

While the Section 6.3 introduced the current position of the retailers with regard to existing transport issues and existing policies, this section presents the interview results with relation to the potential of introducing a UCC and the role of supporting policies and offered services. It is structured into two parts: benefits of using UCCs,

and challenges of using UCCs. In the first part, the findings regarding potential benefits solely for retailers and their willingness to pay will be presented respectively. The two parts are related to each other as when retailers perceive greater benefits of using UCCs and similar initiatives, they become willing to pay. The second part will present findings with regard to the particular challenges of using UCCs for retailers.

6.4.1 Benefits of using a UCC

This section begins with the analysis of potential benefits to retailers of using a UCC, and then discusses their willingness to pay for these benefits.

6.4.1.1 Potential benefits to retailers

The retailers mentioned six different benefits that they may obtain if they would receive their deliveries through a UCC (Table 6.3). They emphasised three points the most; first, the retailers mentioned that they are aware of the fact that consolidation of their deliveries would offer benefits for the environment and for the traffic as packages are delivered in a fewer number of vehicles and these vehicles are low or zero emission vehicles. Some of the retailers think that reducing the number of vehicles would benefit the surroundings of the shops. Second, the retailers want guaranteed days and times for their deliveries. They want to know exactly when their deliveries would arrive at their doorsteps. Third, and related to the second, is the potential operational flexibility brought by being able to modify and improve the delivery speed. Some retailers had different motivations in asking for regular deliveries and when they want to know the size of the shipment. The retailers either are solo workers, or they have one additional staff working at their shops. Knowing how many boxes will arrive and what time they will arrive makes the planning of workspace and staff easier. This is mainly because the retailers receive deliveries from multiple LSPs and if all deliveries would be delivered by a single LSP, which would also provide shipping information, they can do better operational planning.

| Donofita | Descening | Number of |
|---------------------------|--|-----------|
| Denents | Reasoning | retailers |
| The benefits for the | • Decreasing the level of carbon | 6 |
| environment and the | emission | |
| traffic | • Decreasing the level of congestion in | |
| | town centres where consumers visit | |
| | heavily | |
| Regular and customised | • Deliveries would not arrive at the peak | 5 |
| delivery dates and times | times when customers visit shops | |
| | • Deliveries would arrive on the same | |
| | day and time | |
| Operational flexibility | • Timing of the deliveries (whether they | 5 |
| | arrive as quick as the business-as- | |
| | usual) | |
| Knowing the size/the | • Useful for planning of staff and floor | 2 |
| amount of the delivery in | space | |
| advance | | |
| UCC as a single point of | • Dealing with a single entity rather than | 2 |
| communication | dealing with multiple LSPs | |
| | • Enabling better communication | |
| Receiving fewer numbers | • Due to the characteristics of parcels | 1 |
| of deliveries | and space floor constraints, receiving | |
| | the least number of parcels is essential | |

Table 6.3 Benefits of receiving deliveries through a UCC stated by the retailers

The same retailers also think that consolidation would enable them to receive fewer deliveries and they have more time to spare for their customers instead of handling the deliveries (e.g. unpacking, labelling, organizing shelves and recycling). The same retailers want to arrange their deliveries out of the peak times when customers visit heavily. A small number of retailers mentioned that they would be dealing with a single entity rather than several LSPs. According to the retailers it enables better communication as the UCC could be a single point of communication. One of the retailers, who is already renting their own space from a warehouse for deliveries and inventory, mentioned that one of the main benefits of having their own warehouse is that they have their dedicated member of staff. They can communicate with the warehouse crew directly for deliveries from suppliers, deliveries to customers and managing the inventory. This situation also emphasises the importance of having a lower number of points of communication for small and medium retailers.

6.4.1.2 Willingness of retailers to pay for using a UCC

Despite these potential benefits, the financial aspect of using a UCC remains a main factor that drives their decisions heavily. The retailers were asked whether they would be willing to pay for using a UCC considering their supply chains, the local transport policies, and the service offerings. The answers have been grouped under three categories: (1) No willingness to pay, (2) Conditional payment and (3) willing to pay for a UCC. The reasons stated by the retailers for each category are presented in Table 6.4.

The first group of the retailers represent the majority of the retailers. The type of the products and the type of supply chains (including the agreements with their suppliers) drive the retailers' decisions. They do not want to pay for receiving their deliveries because the retailers always order above a certain number of products, and they receive free deliveries from their suppliers:

"At the moment obviously the companies we are buying from support our delivery charges. Adding additional costs on top of that for us does not make any sense. I would not want to volunteer for that. Services would not warrant that we would like the UCC. Anything we want is already in place [Retailer # 5]" The retailers manage their own supply processes and they do not want to deal with the shipping arrangements. All arrangements are done by their suppliers. Second, some of the retailers argued that their current business models are not suitable for using a UCC because their supply chains are managed centrally, and they have their own warehouse space. Another group of retailers do not want to use a UCC because the volume as well as the frequency of their deliveries are not large enough to use the UCC and they are not interested in the additional services. Two of the retailers specifically mentioned that:

"Obviously the benefit would be stopping big trucks coming in; it is a benefit for all of us but generally speaking I do not see it would work for my business [Retailer#28]."

"I do not see it makes any difference to me as long as the deliveries were still coming fairly quickly, I do not see what difference it would make for my business. If it would be held up because of that for days, then it would make a difference [Retailer #7]."

Some of the retailers in this group think that concepts like UCCs could be useful not because of restricting local transport policies and the exemptions from these policies but they think UCCs could offer a certain degree of operational flexibility thanks to the services like tracking and tracing, customised delivery dates and times, and waste management and recycling. However, the retailers still do not find the concept mature enough to be worth paying. The second group of retailers involve the retailers who are willing to pay for using a UCC conditionally. The retailers in this group want to know about the cost of last mile deliveries and the value-added services in advance before any UCC project is in operation. One of the retailers mentioned that they would not be convinced to use a UCC if they use it only for the last mile delivery and added that:

| XX / 11 | Description | Number |
|-----------------------------|--|-----------------|
| wiiingness | Keasoning | 0I rotoilors |
| No willingness to pay | Deliveries from suppliers are free of charge as long as the retailers order above a certain amount No need for the services offered by a UCC Anything that retailers need is in place The concept of UCC is not efficient and do not experience problems with the local transport policies No operational flexibility The type of products and/or are not suitable to use a UCC Value added services are already provided by the existing LSPs and the local transport policies are not restrictive enough The costs of operations are high already for small businesses The number and the frequency of deliveries are | retailers 17 |
| Conditional payment | manageable Already have their own warehouse space The fees paid to a UCC should match with the current fees that retailers pay to LSPs and other third parties currently They would transfer the services (e.g. e-commerce support and recycling & waste management), which they already buy from other vendors to the UCC depending on the subscription fee of the UCC Decision to pay for a UCC depends on the economic considerations when a UCC is established and starts its daily operations. Economic considerations refer to the fees of a UCC, rents, the cost of goods bought and local tax rates Would pay only if the local transport policies increase the cost of delivery operations | 11 |
| Willing to pay | Operational flexibility Environmental and traffic related benefits (e.g. reducing carbon emission and reducing congestion) | 2 |

Table 6.4 Motivation for willingness to pay for using UCCs

"If it was simply taking my parcels and delivering it once a week, I would not want to pay for it but adding in any of these additional services then I would definitely be happy to pay. Even if it is for something like waste management and recycling, I am paying £200/year, that would be instantly a fee I could transfer over to the UCC. Additional stockholding yes, something like that to me values £50 a month because I would only use that at a certain period of the year. So yes. The minimum would be a free bit of delivery once a week, any other thing I would pay for that [Retailer #19]."

Another retailer mentioned that "We would imagine we would want them to match the prices with what we already paying with other service providers. Then we would switch." The third group of retailers showed more interest in paying for using a UCC. Their motives are based on operational flexibility and environmental concerns. One of the retailers, which also has their own warehouse space, mentioned that they would change their current set-up with a UCC due to operational issues:

" If it was on a price comparison and then obviously, we are saving on the environment; we are doing a few different things so even if it was that slightly higher level it would be something we would like to have. Even if the UCC fee came to slightly more than that, the time and the saving from the hassle would probably outweigh the monetary cost because we would have more time to do other things rather than chasing another delivery driver and why deliveries are not completed yet, if they are coming yet [Retailer # 12]."

"The thing with the UCC again about net benefits like less traffic on the road; it improves the overall experience of the city centre and probably I would rather go with it. I guess extra £1 or £2 per parcel on the way in and on the way out it could be £1 or £2 per parcel would not be too much [Retailer # 20]."

6.4.2 Challenges of using a UCC

The results of the interviewees revealed that the retailers see more challenges and disadvantages than the benefits of receiving their deliveries through a UCC (Table 6.5). The challenges can be categorised under three groups strategic, operational and financial, although some challenges overlap all three groups. The first category of challenges consists of financial issues. Financial concerns are of course the concern of each retailer. Even though some of them mentioned that the benefits of using UCCs would outweigh the cost that is caused by adding another step in their supply chain, the retailers, in general, agreed that receiving their deliveries through a UCC will make them pay for their last mile operations. A particular challenge to overcome is that these retailers do not pay extra for the shipment of their deliveries and their suppliers offer free delivery when they place their orders over a certain amount. The retailers also mentioned that the extra cost caused by the use of a UCC may be reflected in the retailing prices and cause price increases. Some of these retailers think that if all restrictive policies would be in place or if the current policies would be more restrictive, it would increase the cost of delivery therefore they become more inclined to use the services of a UCC:

"I think I would use the centre because it would keep my costs down; anything that will keep my costs down I would have to try and accommodate but it will certainly make my life more difficult as a small business [Retailer #13]."

In many cases, the retailers complain about restrictive policies such as parking restrictions and loading/unloading restrictions not only for their impact on their deliveries but also for their impact on customers visiting their shops. The second category of challenges are operational challenges. Adding a new step in a supply chain appears as a challenge in this category as well as the financial section. Some of the retailers mentioned that they may lose control over their deliveries if the products have to be handled one more time. The retailers mentioned that potential breakdowns and errors may cause delays in their deliveries and their products are stuck in one place. Some of the same retailers mentioned that they would prefer receiving their boxes in multiple deliveries. There are two reasons for their request. First, they have a limited floor space and they cannot manage the deliveries if their size is large. They also do not want large deliveries to clash with the visiting hours of their customers.

| Main | Challenges | Reasoning | Number of |
|----------|--------------------|---------------------------------------|-----------|
| category | Chunchges | | retailers |
| | Increasing cost of | • Adding an extra chain to their | 8 |
| IAL | operations | supply chains | |
| ANC | Increasing the | • Due to increases in the cost of | 2 |
| NI | cost of goods | operations | |
| <u>н</u> | sold | | |
| | Delay in | • Due to system break down | 14 |
| | deliveries | • Due to improper management | |
| | | • Due to consolidating all parcels in | |
| | | a single delivery | |
| | No increased | • A UCC would not make time | 5 |
| | efficiency | management more efficient | |
| | | • Due to size of deliveries and the | |
| | | characteristics of the products, | |
| | | there is no value added to last | |
| VAL | | mile operations | |
| IOL | | • Not suitable for the products | |
| RAJ | | which need to go through customs | |
|)PE | | clearance | |
| U | Unable to handle | • Due to working with limited | 5 |
| | deliveries if all | number of staff | |
| | boxes arrive at | | |
| | the same time | | |
| | Compromising | • If there are too many customers, | 5 |
| | from the safety of | there might not be enough space | |
| | goods | to store parcels safely | |
| | | • Loss of control over the deliveries | |
| | | • Damaged deliveries | |
| | | | |

Table 6.5 Challenges of receiving deliveries through a UCC stated by the retailers

| | Sensitivity to the | • | Retailers who place orders in | 2 |
|------------|--------------------|---|------------------------------------|---|
| | timing of | | small batches and frequently | |
| | deliveries | | demand faster deliveries | |
| | | • | Some customers are willing to | |
| | | | pay extra for dedicated slots and | |
| | | | for more accuracy in delivery | |
| | | | time; therefore | |
| | System | ٠ | If the UCC would not work due to | 1 |
| | breakdowns | | system errors, all parcels would | |
| | | | be stuck in one place | |
| | Orienteering | ٠ | Defining the responsibilities, | 3 |
| | problems with | | liabilities and financial plans | |
| | the new system | • | Transfer of liability and | |
| | | | responsibility of parcels | |
| | Characteristics of | • | Goods produced on make-to- | 2 |
| GIC | products | | order basis are not suitable for | |
| TTE | | | shipping through a UCC | |
| TR≜ | | • | Goods that do not need special | |
| Ň | | | delivery | |
| | Relationship | • | Breaking established relationships | 1 |
| | management with | | with other stakeholders | |
| | suppliers and | | | |
| | LSPs | | | |
| | 1 | | | |

Second, if there is a problem with the system of UCCs, they would receive none of their products as they may be consolidated into a single delivery. This would be particularly problematic if they run out of stock. The retailers acknowledge the environmental and traffic related benefits of having fewer vehicles on the streets; however, they argue that deliveries would take longer as fewer number of trucks will deliver the same number of packages:

"It may cause delays in deliveries as delivering the same number of packages with fewer trucks may take longer than business-as-usual [Retailer #20]."

The last point in this section was raised by one particular retailer, which import some of their products from overseas locations. Their products need to go through customs clearance, and they need to be offloaded immediately. It is not feasible for these types of products. Adding another step in the supply chain came up as an issue from different angles during the interviews. From the strategic point of view, the retailers mentioned that every addition to supply chains may complicate the operations in terms of cost, the liability and the transfer of the products' responsibility. This is mainly because of the orienteering problems with a new system of receiving deliveries. The retailers hesitate to transfer to a newer distribution system due to these issues as they need to define roles and responsibilities again with a new distribution system. They also argue that they have established relationships with the current LSPs that serve their premises and using a UCC would break their established relationships.

6.5 The impact of supportive UFT policies on the willingness of retailers to use a UCC

This section starts with a discussion of the general relationship between retailers and public policymakers, and then provides the analysis of a list of specific policies relating to UCC support.

6.5.1 Relationship with public policymakers

The retailers mentioned that they do not have direct involvement with the city council, so they do not communicate directly. If the city council changes any regulations that relate to the retailers, then they send letters to the retailers. The ones that are communicating more with the council do it through business/trade associations. A

small number of retailers (4) are either aware of meetings between the city council and the trade/business associations or they are directly involved with the trade/business associations. Some of the retailers said they would like to communicate more about their problems/concerns/questions, but they don't think the relationship between two parties would improve. One of the retailers wants to communicate more but the owner does not know how the communication channels should be developed. Table 6.6 shows the two categories which the retailers fall into two groups when asked if there should be any change in the communication between the two parties.

| The level of communication | Reasoning | Number of retailers |
|---|---|---------------------|
| Increased level of | Transparent and open dialogue concerning | 5 |
| communication | taxes and services offered by the city council | |
| | More direct ways of getting in touch with the council | 3 |
| | Early involvement of retailers in the implementation of local transport policies | 2 |
| | Regular and timely updates about the changes in the local transport policies parking restrictions | 2 |
| | A regular forum between public authorities and retailers | 1 |
| | A dedicated unit focusing on small businesses | 1 |
| No change in the level of communication | No problem with the current state of communication | 16 |

Table 6.6 The level of commutation with the public authorities

14 of the 30 retailers are not directly involved with the city council, but they want to improve the communication between these two parties. They want to increase the communication, but some do not know how. They want more transparency and open dialogue concerning taxes and services offered by the city council. The retailers also want to be informed well in advance concerning potential changes in the regulations, particularly they are mainly concerned with parking regulations, so they want updates if there is any change in the parking restrictions. They also want to discuss parking regulations as they potentially could be restricting the general public

and the retailers might lose customers because of these regulations. The retailers would like more obvious way of getting in touch with the council as one of the retailers mentioned that:

"Maybe it should be more obvious on how to get in touch with them. I suppose we get letters for road closures. Maybe it is because I do not have that much to talk about [Retailer #25]."

A regular forum between the two parties to communicate the council's plans/programmes and how they would affect the small businesses was raised by some retailers, even perhaps a dedicated unit to take care of small businesses. The retailers said that the local authority should involve the retailers if they are implementing policies that restrict parking and traffic movements which would have a direct impact on them.

6.5.2 Analysis of specific policies

This section presents the findings from the interviewees with the retailers about nine transport policies. Some of these policies are already in place in some places in Edinburgh and one of the incentives (e.g., OHD) are already used by one of the retailers. Time window restrictions, loading/unloading restrictions, parking restrictions and loading/unloading bays are in place in and around the neighbourhoods where the retailers are located. In addition, Edinburgh is introducing LEZs by 2020 (Transport Scotland, 2020).

The discussion with the retailers was based on whether one or more of these local transport policies would affect their decisions on using UCCs for their last mile deliveries. The first result to note is that in some cases the retailers replied that a proposed policy is not possible or applicable in their location and in many cases, they did not have any opinion on a proposed policy (Table 6.7). More than half of the retailers stated that the enforcements through local transport policies do not incentivise them to change the way of receiving their deliveries or they do not have any opinions about how enforcements would impact them and whether they would like to change the way of receiving deliveries. One quarter of the retailers stated that the restrictions and the incentives would make them more likely to receive their last mile service from a UCC under particular circumstances.

Table 6.7 presents that despite the exemptions, the retailers stated that the policy measures such as parking restrictions, loading/unloading restrictions and time window restrictions (exempt if using the UCC) would make them less like to receive their deliveries through a UCC. This is a counter-intuitive result. However, it can be explained in two ways: First, the retailers can be biased to against all policy changes. Second, the same retailers are worried about the implications of the parking restrictions on their customers, even if they themselves are exempt. Another issue has been identified which may indicate to the policy bias by the retailers. Many retailers also stated that increased number of LUBs is not a good enough initiative for choosing to use a UCC despite the fact that LUBs would work in favour of easing the delivery activities.

| Policy group | Policies | More likely | Less likely | Not an option | No opinion |
|---------------|-------------------------------|----------------|----------------|------------------|---------------|
| Parking and | Parking restrictions (exempt | 9 | 13 | 0 | 8 |
| loading | if using the UCC) | | | | |
| | Loading/unloading | 7 | 14 | 0 | 9 |
| | restrictions (exempt if using | | | | |
| | the UCC) | | | | |
| | Time window restrictions | 6 | 13 | 1 | 10 |
| | (exempt if using the UCC) | | | | |
| | Increased availability of | 4 | 12 | 0 | 14 |
| | dedicated LUBs | | | | |
| Emissions and | Low emission zones (exempt | 7 | 11 | 0 | 12 |
| congestion | if using the UCC) | | | | |
| | Congestion charge (exempt if | 7 | 12 | 0 | 11 |
| | using the UCC) | | | | |
| Other | Delivery and servicing plans | 2 | 9 | 2 | 17 |
| | Pedestrianisation (exempt if | 1 | 0 | 29 | 0 |
| | using the UCC) | | | | |
| | Out-of-hour deliveries | 1 | 1 | 26 | 2 |

Table 6.7 The opinions of retailers about the effect of policies on their likelihood to use a UCC

The nine policy measures can be put into three groups (Table 6.7): (1) Parking and loading, (2) Emissions and congestion, and (3) Other. Regarding parking and loading policies, retailers are particularly concerned about these policies as they interfere with their deliveries and with the visits of their customers. One retailer mentioned that they are aware of the importance of the policies and their calming impact on the traffic however they find the design of the policies problematic. The problems occur due to the duration and the quantity of the policies as the movements of goods vehicles and individual cars are restricted by multiple policies. Some of the retailers occasionally bring parcels with their own cars and they suffer problems due to parking limitations and the lack of dedicated parking bays. Limiting parking bays is one of the most common precautions that local authorities often implement to decrease the number of cars travelling in the city, particularly in certain traffic hotspots.

"The problem is related to the restrictions directly. They need to be redesigned as duration as well as the quantity of restrictions are disruptive to the businesses [Retailer #5]."

"Definitely parking restrictions, it becomes a constraining factor for us when there is no parking for customers. It would be good to have dedicated parking for the customers on street or somewhere else. Sometimes if I want to pick up something in the evening or do something here, it is good to be able to park outside instead of waiting up to until certain times. Other than that, I think the others are okay [Retailer #24].

"First one, the time window restrictions, it is a disadvantage for us because we are a small and independent shop, if somebody just wants to run in for a gift or a card obviously, they would not stop because of the restrictions [Retailer #21]."

On the other hand, a group amongst the retailers think that the policies do not pose any threat to their deliveries and one of the retailers argued that policies such as parking restrictions and time window restrictions might work in the favour of freight vehicles when they deliver during the daytime:

"If there is a smaller number of cars parking outside, freight vehicles can find more space to park and load/unload goods [Retailer #27]."

The design of the policies and the extent (whom to include, time intervals) are very important factors to decide and they should not be harmful to the customers and the retailers' own vehicles if the restrictions will be increased and it will particularly put more pressure on personal vehicles. The retailers were asked whether they would prefer using UCCs if the deliveries from UCCs would be exempted from parking and loading restrictions. A small group of the retailers were willing to use UCCs only if the timing and the number of the restrictions would be increased. Otherwise, the retailers prefer seeing local authorities take actions which would not increase the cost of receiving deliveries such as evaluating the existing policies to redesign and increasing the number of designated LUBs as well as parking bays for individuals' cars.

Another group of retailers, which do not get affected by the parking and loading restrictions are the retailers owning warehouses and the retailers receiving deliveries by their company-owned vehicles. These retailers have centralised distribution mechanisms, and they are not concerned about the local transport policies and these policies do not affect their decision in terms of choosing to use UCC:

"I do not know how I would react. I think we would just deal with that. I do not know how you would be exempted by using that. Congestion charge, you have to really think about that. It depends on what kind of restrictions. I think generally the UCC is a bad idea and I would not be tempted to use it unless it is costing me vast amount of cash and I am not really in favour of it. Because I think it is just an extra and I think there is already enough steps in the supply chain [Retailer #28].

One of the retailers mentioned that the number of parcels coming to the shop are fewer therefore they do not get restricted by the local transport policies such as time window restrictions, parking restrictions, loading/unloading restrictions, LEZ or congestion charge. Another retailer argued that their distribution channels are wellestablished, and it is flexible towards local transport policies as they have their own vehicles for making the deliveries and they also work with LSPs for some of their deliveries.

Looking at the second group of policies, those related to emissions and congestion, the retailers, who mentioned that parking and loading policies do not pose any problem for their deliveries, mentioned that it would be inevitable to pay for LEZ and/or congestion charge if they would be introduced. The retailers have various and opposing opinions amongst them concerning LEZ and congestion charge. The retailers argue that public authorities implement policies such as 20-mile zones and they think

that these type of transport policies essentially cause more emission and congestion in the city:

"For a diesel vehicle to try and go under 20 miles per hour produces more fumes and more problems. The only way they seem to be pleased is when there is no traffic at all so most times you cannot go more than 20 mile per hour but the fact that you are making everybody going under 20 miles per hour in a congested area, you are adding to it [Retailer #19]."

"LEZs, I agree with them to some extent, but you have got city council who want to reduce the number of traffic in some part of Edinburgh which means causing more traffic in other parts of Edinburgh. Longer cars are running with their engines on they create more emissions. The natural fact that the council is creating more emissions, it's not the people creating emissions. 20-mile zones are creating emissions, so they need to get rid of that. Congestion charge, I would not go for a charge because it is ridiculous to have for a city in the size of Edinburgh. They tried to bring it before and when the people voted against it then that is when the council became anti-car [Retailer #15]."

Some of the retailers argued that the implementation of emission and congestion related policies would be unfair for LSPs and suppliers and they would get affected eventually. The retailers in this group mentioned that they support the actions taken by the public authorities to create a better environment for the citizens of the city. Reduction of traffic, providing more space for pedestrians, attempt to decrease the levels of carbon dioxide emissions as well as other pollutants are the priorities of the local authority to create a better environment. However, one of the common beliefs amongst the retailers is that if some components of the traffic would be changed and regulated in a different way, public authorities would not need to implement restrictions such as LEZ and congestion charge as stated by one of the retailers:

"I am all for helping prevent climate change and lowering the pollution, etc. Congestion charge makes sense, there might be a lot people who are carpooling or using public transport. It is not like you can carpool deliveries because they are already carpooled in one big lorry so I do not really see how that can feasibly be changed in any way other than providing rewards or penalties to the courier companies for using high emission vehicles. Personally, I feel like this can be combated rather than spending so much money on the trams. Turning all buses to green buses would have helped [Retailer #26]."

One of the main concerns is that retailers would be affected if LSPs would not have suitable vehicles at the time of implementation of local transport policies; however, one of the retailers already mentioned that they are observing a transition from conventional vehicles to electric vehicles and low emission vehicles:

"A lot of delivery trucks have got like they are switching to EVs and low emission vehicles. I do not think that is going to affect us that much because delivery companies already sorted their vehicles. Congestion charge, I think it would be unfair to pose it on delivery vehicles and it makes the cost of deliveries even more. When we are delivering, we would have to include that in our prices and pass it to our customers as well; so, everything would go up, which I am not really a fan of [Retailer #12]."

Some of these retailers are already familiar with the impacts of emission and congestion policies on their costs because they are selling their products online and shipping them to other cities as well as countries and they are exposed to increased charges due to the implementation of congestion charge and LEZs in cities such as London.

"We end up working around them. For instance, congestion charge, if I were delivering to London, DPD would charge me extra if postcodes are within the charging zone. So, I have an average charge but that could be an issue. So, it would be the same here if it were implemented here unless customers come and collect the boxes from here. The other ones, for instance LEZ is a great idea and I do not know how it would work [Retailer #3]."

The third group contains the three policies that received little interest from the retailers. This is mainly due to the fact that these policies are not applicable in many cases due to their geographical locations and the ways that they run their businesses. Pedestrianisation, delivery and service planning and OHD were discussed with the retailers. It is interesting to find out that the retailers in pedestrianised areas are not in favour of this policy whereas the retailers who are not located in pedestrianised areas

thought that pedestrianisation would attract more customers and it would potentially be beneficial for their businesses.

"I think increasing in pedestrianised areas definitely here it would be difficult to implement but the difference between the lower end high street and top end of the high street in terms of footfall is chalk and cheese because they are pedestrianised. So, most of the traffic, the foot traffic stays at the top because of that and bottom end of the high street really misses out I think [Retailer #8]"

"I would prefer this street is not pedestrianised because a lot of our customers will just stop the car for couple of minutes and run in; but I can also see the benefit of having it pedestrianised. I think from the shoppers' point of view, from customer's point of view, it's a relaxing thing because you do not have to constantly check the traffic and so yes, we prefer there is no parking restrictions and in fact more non-residents permit parking because it's very limited where people can actually park. As a business owner I would prefer customers would be able to get closer in their car [Retailer #7]."

Only one of the retailers uses OHD with one of their suppliers, where the supplier has the key to the shop and can make deliveries out of business hours. Making deliveries outside of regular business hours is not an option for the retailers as they either work alone or with few numbers of people in their shops. DSP is not widely known amongst the retailers as they mentioned that they do not have an opinion about the concept, and they would not foresee any benefits of the concept for their deliveries. On the other hand, some retailers have a good understanding of how different local transport policies could be used together to enhance delivery operations. However, it was not observed amongst these retailers that DSP, pedestrianisation and/or OHD affect the opinions of the retailers to use UCCs:

"DSPs would have to come into if congestion charge went ahead and potentially things like that because logistics just wouldn't work if there is no plan to get vehicles in and out [Retailer #12]."

"DSPs, again we tried to do that in the past, it's difficult because the suppliers don't like it; they would rather deliver to you as it becomes available as opposed to actually having a timed delivery [Retailer #27]." A very common opinion amongst the retailers was that the local transport policies do not play a role in their decision making between their current system and transferring their last mile deliveries to a UCC. Rather their financial strength, UCC's operational performance and other variables such as business rates and local taxes are the key factors. Accommodating the change is another common attitude amongst the retailers. They argue that they do not experience problems as long as they adapt to changes caused by local transport policies. It was also observed that all the main players of UFT (e.g. retailers and LSPs) are very responsive to the changes that may occur due to the implementation of local transport policies. Particularly LSPs respond to changes through extending their work hours and renovating their fleet from conventional to low emission.

"You accommodate all the changes. You have to change to accommodate these changes. If you have a shop you have to be adaptable. I never experience difficulties; I am here for 20 years and I did not have any problem [Retailer #17]."

"To be honest, a lot of delivery drivers have changed their times, and they are working longer hours now and we are not closed when they arrive, we are still open. So, I actually don't have any problems. Sometimes we have problems when drivers arrive too early and they put a note through the door. Usually what happen is when you know the driver, he will then come back to you anyway [Retailer #9]."

"If LEZ comes to the situation, a lot of van drivers and their companies know about this anyway, so they will sort of come into line with the changes and it will not affect my business. If there would be a congestion charge, that would affect some sales but not a lot. I got to emphasise that our pure business is based on foot flow which is a good thing [Retailer #10]."

6.6 The impact of service offerings on the willingness of retailers to use a UCC

The retailers were asked if one or more of the following service offerings would make a UCC more attractive: electric vehicles, customised delivery dates /times, stockholding, pre-retailing, waste management, e-commerce, tracking & tracing. Table 6.8 presents their responses.

| Value-added services | More attractive | No change |
|---------------------------------|-----------------|-----------|
| Customised delivery date & time | 17 | 13 |
| Tracking & tracing | 16 | 14 |
| Electric vehicles | 15 | 15 |
| Waste management & recycling | 15 | 15 |
| Additional stockholding | 11 | 19 |
| E-commerce support | 10 | 20 |
| Pre-retailing | 0 | 30 |

Table 6.8 The opinions of retailers about the effect of value-added services on their perceptions

Some of the retailers mentioned that early delivery possibilities, wide variety of time/date offerings, and knowing the exact delivery times are the features that they are looking for if they would use a UCC for their deliveries. The retailers already receive this service from the current LSPs that they are working with. Some of the retailers mentioned that if a UCC can guarantee customised date and time slots, it would make the concept more preferable. However, this service is not enough to convince the retailers to use a UCC due to lack of additional benefits for the retailers.

"I imagine knowing how many boxes coming in one day and in each delivery would be really good because also sometimes we have issues with - it does not happen all the time - boxes come very late from some people and you cannot process them until the next day so I guess in that sense it would be really good and also knowing how many boxes will be coming that day, it is always good to know [Retailer #2]."

"Customised time and date are really good if you can do that because then I can time it but it is also time consuming because either I have to book it or they have to call me and then I need to train all the staff. As long as you get good organised time plan for it; even if it is online. Most of the couriers provide time slots already so we know staff is always here when deliveries arrive [Retailer #6]."

"Again, it would be depending on whether they are offered for free or based on a charge, but I would certainly want customised delivery times and dates, so I could control what was being delivered so I did not have everything comes at once [Retailer #13]"

Also, the retailers which have their own warehouse spaces / centralised distribution centres mentioned that their companies handle the deliveries and they do not need this service. When asked about tracking and tracing, it was found that the retailers receive this service from their current service providers; therefore, they do not need to buy this service from a UCC unless they receive their deliveries through the UCC.

"Tracking and tracing is essential for us because our items are not low-priced items, so we need to know that they are trackable. We do have e-commerce services and tracking and tracing, but I think they could be made better [Retailer #7]"

Electric vehicles are one of the most favourable features of UCCs according to the retailers. Electric vehicles are already becoming popular and widely used to deliver goods in cities. Local authorities both independently and in collaboration with LSPs are encouraging the logistics industry to switch to low emission vehicles such as electric or other types of low emission vehicles (e.g., gas or hybrid). While the retailers are sensitive and conscious about the environmental impacts of road transport, some believe that such efforts benefit the environment more than the local businesses. This is one of the reasons why local transport policies and service offerings are not enough to convince retailers. Some representative quotes include:

"Delivery by electric vehicles would be good because we do everything here on an ethical and fair basis [Retailer #5]."

"We are quite environmentally conscious; I think deliveries by electric vehicles would be the biggest selling point for us. The rest of it we got sort of taken care of already by our own workshop and by our people [Retailer #22]."

The retailers in Edinburgh pay third party companies to handle their recyclable materials such as carboard boxes, glasses, plastics and food waste. Some of the retailers mentioned that they struggle with waste management and recycling on a daily basis as they are lacking space and staff to take care of recycling. Also, some of the retailers mentioned that they are not happy with their current service providers, and they could change only if the prices match with their current spending. The retailers, who are not interested in this service, mentioned that they are happy with their current service providers, and they are concerned with the quality of the service. One of the retailers specifically mentioned that:

"The boxes and the waste can be carried in the same vehicles and I do not approve this. Even though they would be carried in separate vehicles, is still would not convince me to use a UCC [Retailer#3]. "

The individual shops in Edinburgh are characterised by a limited floor space as is the case in many cities where the land is very valuable, and space is scarce. Therefore, stockholding is a type of service that the retailers considered useful. Some of the shops mentioned that they need extra space particularly during the holiday seasons (e.g. Christmas) when the number as well as the frequency of the deliveries increase. Pre-retailing services were not favourited by the retailers. Waste management and recycling is another type of service that the retailers stated their interests.

E-commerce is another value-added service that may be offered to the retailers. Even though some of the retailers find this service useful, the retailers did not show interest in using this particular service due to various reasons. The retailers would buy this service from a UCC if the UCC offer a better deal than their current service providers. The retailers also think that it would decrease the complexity of their inhouse operations if they could send some of the deliveries from the UCC to their customers directly. These were the positive aspects of buying e-commerce services from a UCC. There are several reasons why the retailers do not need this service from a UCC. First, some of the retailers do not sell their products online. Second, the retailers, who already have their own warehouses, they send their products from either the warehouse or from suppliers' facilities to their customers.

Finally, none of the retailers would prefer to buy pre-retailing services from UCCs. Pre-retailing services include activities such as barcoding and/or tagging of goods and preparing goods for shelf/window display. This particular service is the

only service that not one out of 30 retailers would buy from UCCs. The common belief is that the retailers want to perform these operations by themselves even if they are lacking floor space and/or personnel. The main reasons could be due to security concerns and the potential delays that could occur due to performing pre-retailing operations at UCCs. These concerns were not mentioned by the retailers specifically in relation to this service but were listed by them as some of the challenges of using UCCs. Also, the retailers could see pre-retailing activities as simple tasks which are not worth paying extra considering how cost sensitive the retailers are.

6.7 Summary

This study has investigated how particular urban freight policies (e.g., time window restrictions, LEZs, availability of LUBs) and services (e.g., providing warehousing space, waste management, customised delivery times) affect the perceptions of the retailers in starting to receive their deliveries through UCCs. The stud has focused on a particular audience, which consists of individual small and medium sized retailers. The deliveries to this type of retailers generate freight flow in urban areas which increases the level of traffic in cities. Unlike large chain stores small and medium sized retailers receive many deliveries delivered by multiple LSPs and suppliers throughout the day. Deliveries with underutilised vehicles is one of the most critical problems caused by UFT. Unless vehicles are low or zero emission vehicles, they all contribute to the air pollution significantly. Environment, businesses as well as the society benefit from consolidating parcels that are going to be delivered to the same location and/or neighbourhoods because load consolidation decreases the number of vehicles used for delivering the same number of packages.

UCCs have been studied extensively in the literature in recent years. Most studies have examined either the development process or the costs for users. Some have also explored the role of supportive policies and value-added services. Few papers have addressed the users (retailers) directly, thus this study takes a close look at the retailer perspective. As the receivers of the goods that must pass through the UCC, retailers are the ultimate user and thus the most affected by changes in distribution patterns. Results show that, in general they are not positive towards using UCCs, and the services that they need are already being provided by their LSPs. In
terms of UFT policies, they are particularly against LEZs and congestion charges but in favour of more loading bays. However, they are aware of the increase in restrictive policies in city centres, and if they were forced by restrictions and rising costs to use the UCC, they would be prepared to do so. In that case, they would want those services currently provided by LSPs to be provided by the UCC and would be prepared to pay for them.

Another result that has been obtained through the analysis of interview data is related to whether the location and the traffic related characteristics of these particular locations affect the views of the retailers. First, the type of policy measures that are implemented across the locations are similar. All locations have parking restrictions, time-window restrictions, loading and unloading restrictions and designated LUBs. There are differences in the time of these restrictions when they are in effect. The level of the traffic in the area affects the type and the characteristics of policy measures in place. Locations with continuous and high-volume traffic flow have more stricter restriction for parking and loading and unloading. For instance, Stockbridge is a location with intense vehicle traffic. The participants in Stockbridge struggle with receiving their deliveries due to the restrictions. The participants showed their willingness to participate in a UCC scheme under conditions such as exemptions from restrictions.

However, it was not possible to see such clear relationship between the views of the retailers and the transport characteristics of the locations in other places and whether it has any influence on their decisions to use a UCC. For instance, Bruntsfield/Morningside is a large area which accommodates a great mix of retailers and the policy measures are the same all along Bruntsfield-Morningside direction. The retailers have problems with parking restrictions, and time-window restrictions because of the fact that these restrictions affect the volume of customers that visit the area to do shopping. The same retailers do not experience problems with regards to their deliveries as a result of the restrictions. Some retailers are concerned with the lack of designated LUBs and/or illegal use of the designated places by other vehicles. This situation causes delays in the arrival time of their deliveries as drivers are not able to find a spot in close proximity to make deliveries to the retailers. None of these difficulties affected the retailers' opinions about using a UCC. The retailers, who showed willingness to pay for using a UCC, want to participate in a UCC scheme mainly because of the operational benefits that a UCC would offer for their business in addition to basic delivery and consolidation services. The findings based on the data collected from the retailers in the following areas, Canongate, Jeffrey Street, St Mary's Street, Tollcross, West Bow, Greyfriars, Thistle Street, did not show any particular relationship between the views of the retailers and the transport characteristics of the locations in other places for using a UCC. A general consensus exists between retailers in these areas as (1) they experience problems that are caused by current parking restrictions, loading and unloading restrictions, time window restrictions, and the lack of designated LUBs, and (2) the adverse effect of these policy measures on their customers and on the timing of their deliveries. However, none of these conditions suffice to rationalise the use of UCC for their deliveries. The retailers, who want to use a UCC, prefer joining a potential scheme due to the operational benefits.

7.1 Introduction

This chapter consists of two sections; the first section presents the discussion of the results from Chapter 4, 5 & 6. The second section presents the synthesis of the findings. The purpose of the second section is to discuss all findings with respect to policymaking in local authorities, stakeholders' influence on policymaking, the relationship between policymaking and logistics needs and services, and the role of public authorities in regulating UFT. A brief summary is presented at the end of this chapter.

7.2 Urban freight transport in local authorities

The first finding from this study showed that the goals are essentially identical. Environmental protection, economic growth, reducing congestion, enabling safe and secure transport and creating vibrant and attractive city centres are the most common goals, which have been identified as a result of the interviews and the analysis of the documents. In terms of policy measures to accomplish these goals, the study confirms previous literature that restrictions are the most common type of measures (Quak, 2008; Ballantyne et al., 2013; Lindholm and Blinge, 2014), yet there was a noted difference across the cities, with Swedish cities more likely to choose interventionist measures such as congestion charges and LEZs. Swedish cities also implement time windows, weight and size restrictions. Similarly, restrictions are the most common policy measures implemented in the cities in England and Scotland. More voluntary measures such as vehicle recognition schemes are preferred in Scotland and England where there is evidence of less collaboration between public and private sectors hence a reluctance on the part of local authorities to enforce restrictive measures.

Setting targets and collecting performance measurements are crucial activities that help local authorities quantify the benefits of policy measures and determine if they have achieved their goals and what improvements might be needed (Lindholm, 2013). However, only a limited number of the cities perform such monitoring. All case cities measure emission levels, but most perform the measurements for the entire traffic activity; only very few cities analyse emission or traffic levels with respect to freight vehicles. The other most common targets are the number of road casualties, journey time reliability and level of traffic on local roads and trunk roads, but these are difficult to link with specific policy measures. It was mentioned by the case cities that the main reasons why local authorities do not perform ex-post analysis of the policy measures is a lack of financial and human resources. This finding is also confirmed by Fossheim and Andersen (2017), who found that many freight plans are missing a thorough justification of whether their freight strategies were successful, and their targets were met. The lack of emphasis on specific targets and post-hoc monitoring suggests that UFT policy measures are chosen from the pool of common measures described above more because of public acceptability, frequency of use elsewhere and ease of implementation than because of a well-justified, contextspecific link with policy goals. This does not necessarily mean that the measures chosen are inappropriate, but that there is a lack of strategy, reviewing and updating according to achieving specific policy goals.

The next conclusions relate to the influence on policy choice of policy context and governance dynamics, resource availability and legitimacy – the three types of influence identified by Marsden and Reardon (2017). There was in fact significant interrelation between the three types of influence, but it is unsurprising that to some extent resource availability underpins all of them. Availability of resources (particularly funding) allows the hiring of dedicated personnel, which in turn provides the ability to increase integration with other policy areas (policy context and governance dynamics) and to interact with industry and citizens (legitimacy). While city involvement in funded EU projects was considered primarily as a source of resources, interviews revealed that it is also important for obtaining legitimacy by being active in the UFT policy arena, collaborating with other cities with the potential to identify and transfer successful policies from elsewhere.

The more proactive cities have a vision running through their internal and external activities. The analysis revealed a strong relationship between the level of participation in UFT projects, the level of integration of UFT in local transport policy documents and the level of intervention in UFT policy measures. The findings of this study confirm previous studies (e.g., Kiba-Janiak, 2017; Lindholm and Blinge, 2014;

Lindholm and Browne, 2013) highlighting that UFT has been given limited attention in local transport planning in many cities which primarily focus on public transport and infrastructure investments. Yet the interviews showed that local authority planners are aware of the importance of UFT and the need for policy measures. Where they have experienced challenges integrating UFT within their governance dynamic, it is often a result of a lack of resources and a realistic decision to focus scarce resources on other areas.

Marsden et al. (2011) argued that policy learning requires trust and knowledge exchange between different parties and curiosity among the policymakers. The majority of the local authorities in this study consider collaboration between public authorities and private stakeholders (cf. Lindholm and Behrends, 2012; Fossheim and Andersen, 2017) as essential and stressed the importance of engaging with stakeholders as the collaboration can have positive impacts on policy choice as well as outcome (Lindholm and Browne, 2013). This study showed that such interaction is more common in Sweden than in England and particularly Scotland, where interviewees revealed a lack of interest on the part of the private sector. The UCC in Gothenburg, the UCC for construction sites in Stockholm, and the pilot study for OHD scheme are some of the policy measures in place in Sweden. These policy measures are either fully operational for many years or in trial phase. These policy measures have been implemented as a result of an active and long-term engagement amongst various public and private stakeholders. Freight operators obviously prefer less interventionist policies but, as stated by Lindholm and Blinge (2014), if local authorities want to achieve their local transport goals, they need to develop policies which combine incentives, agreements and enforcements, and they need to develop such complex policies in collaboration with other stakeholders.

The results showed that increased awareness of problems with local air quality in the UK is the key driver of political salience that is beginning to unite local and national transport policy goals and is expected to lead to more stringent policy action. Yet the actual policy choice to address this problem must be politically acceptable. In Sweden they have made better progress in working with the private sector to make restrictive policies more acceptable.

7.3 Supporting urban consolidation centres with local transport policies

While the challenges of UCCs were not the main focus of this study but rather a contextual factor in our overall analysis of the policy issues, we can identify the main challenges in our two cases. These were financial viability, need for political support and operational obstacles (e.g., lack of delivery schedules, lack of information system infrastructure, losing first contact with the customers), the latter clearly affecting primarily the LSPs rather than the other two stakeholder groups. Financial viability is the obvious challenge, due to a lack of customer base and usually requires political support via public subsidy to overcome, as also found by several previous authors (e.g., Browne et al. 2005; Quak et al., 2014; Björklund et al., 2017; Johansson and Björklund 2017; Kin et al. 2016). But this challenge arises in effect from the operational challenges that deter users. One of the key themes in the interviews was that the LSPs currently serving their customers directly are reluctant to pay for the additional cost caused by adding another link to their supply chains (as also found by Allen et al. 2014; Quak et al., 2014). In addition to the pure cost issue, the LSPs do not want to lose the direct contact with their customers (as also found by Allen et al. 2014).

It is crucial for public-led projects to identify a potential operator and potential users for the UCC and ensure that they will not be financially penalised for using it, usually requiring public subsidy, which confirms the findings of Lagorio et al. (2016). The public stakeholders should be able to show LSPs that they can obtain operational benefits by outsourcing their last mile deliveries, if they want to attract more users (Quak et al., 2014). In fact, the saving of transport costs by the LSP in the Gothenburg case through using larger vehicles to deliver to the UCC confirms the argument of Janjevic and Ndiaye (2017) that a UCC should be able to decrease delivery costs through providing gains in terms of distance and time.

The second category of findings relates to stakeholder collaboration. According to Björklund and Johansson (2018), even though stakeholder collaboration is often mentioned in the literature, none of the studied articles went into detail describing this collaboration. Managing a large number of stakeholders with different goals, costs, and benefits of using a UCC is a challenging task. To what extent poor collaboration between stakeholders is a reason behind frequent failures of UCCs is an important question yet to be addressed. In order to fully analyse the position of each stakeholder group, a larger quantity of data would be needed through a large-scale survey of each group (e.g., Marcucci and Gatta, 2017, on retailers). Nevertheless, some conclusions can be drawn from this study regarding the perspectives of each group and their collaboration.

According to Harrington et al. (2016), the three main stakeholder groups are local authorities, LSPs, and retailers, all three of which were interviewed for this study. The different perspective of each group was clear and aligned between both cases. The local authorities want to support business but equally recognise the growing need to be more proactive in achieving lower emissions in the city centre. Retailers do not have a strong opinion and simply want to continue receiving the same service they currently enjoy. LSPs would ideally prefer to be left alone by public actors, but the Swedish case showed that over time, through ongoing collaboration and to some extent the co-creation of UFT policies, they can accept the need to be involved.

While the final customer of the delivery services is local retailers, in fact they appear to have little concern about using UCCs as there is little discernible impact from their perspective. It is in fact LSPs who are the real users of the UCC. It is their business model being changed, their deliveries complicated, and they have to pay the UCC fees. This is an important finding that tends to be overlooked. The successful case showed that service offerings can be attractive but only once they are already using the UCC – the offerings themselves do not incentivise the use. This is where the public authority perspective as discussed in this chapter is crucial, which has been under-researched in relation to UCCs, and only little addressed in terms of UFT in general (see first part of the thesis).

van Duin et al. (2010) identified two major difficulties with the implementation of UCCs: the allocation of the costs and benefits and the willingness to cooperate of the transportation companies. They argue that, while retailers and transport companies obtain certain benefits from using services provided by a UCC, operators of UCCs incur costs of operating UCCs, thus local authorities should play a role in bringing the costs and benefits together. The conclusion from two cases is that the local authority must provide strong support, by subsidizing the start-up phase so

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there are no additional costs to the transport providers, and also to some degree forcing them to use it by applying traffic restrictions that are then lifted for UCC users. This lead by the public actors confirms previous studies that continue to show a reluctance from the private sector to develop UCCs (Browne et al. 2005; van Duin et al., 2010; van Duin et al. 2018). This could also indicate a need for better guidelines on the national and the local levels in order to increase the understanding of urban freight, as argued by Gammelgaard et al. (2017). Applying the framework of four elements of good UCC collaboration identified by van Duin et al. (2018) clearly showed that the successful UCC applied all four elements whereas the unsuccessful case failed to build on large players or empower small players. These factors relate to the UCC development process, but the findings emerging in this study underline the need for this process to build on a previous foundation of public-private collaboration and a supportive UFT policy setting.

The third category as well as the main focus of this study is the role of supportive policies that affect the viability of UCC projects. The start-up and structural finance were absolutely essential to the successful case, supported by favourable measures to the UCC operator. In terms of the more recognisable UFT policies that supported the UCC (termed "indirect regulatory support" by Lebeau et al. 2017), the findings confirm the previous research, showing that all but one was applied. According to interviewees, the most effective policy was to lift the existing time window restrictions for the users of the UCC. According to Björklund et al. (2017), ongoing collaboration between the local authority and industry can establish a growing evidence base which helps local authorities identify how existing policies can support the use of a new UCC and how these policies should be altered or improved over time based on the demand for transport and related value-added activities in areas served by UCCs.

Compared to previous studies, the successful Gothenburg case in this chapter showed the importance of having policies in place for some time before implementing the UCC. The Vicenza case studied by Ville et al. (2013) revealed a legal battle between the local authority and the association of freight transport carriers, whereas in Gothenburg the local businesses and the LSPs were already familiar with operating under restrictive measures, as time window restrictions, weight restrictions, urban tolls, and age restrictions for vehicles had been in place before implementing the UCC scheme. While on one hand, these "supportive" policies could perhaps more realistically be considered as ways to force operators to use the UCC, in fact in the case of Gothenburg they were already in place to reduce traffic in the centre rather than being implemented specifically to support the UCC. This finding supports the importance of understanding the public authority role and linking the wider UFT policy setting with the individual UCC development which has been under researched thus far.

The final category of findings consists of service offerings that UCCs can provide to be more attractive or raise additional revenue. Value-added services and the use of electric vehicles are widely discussed in the existing literature such as preretailing services, waste management, e-commerce services and stockholding (Browne et al., 2011; Johansson and Björklund, 2017; Paddeu, 2017). The UCC in Gothenburg offered electric vehicles and e-commerce services and later developed another revenue stream via using their electric vehicles for advertising. The Perth UCC was also planning electric vehicles as well as the more traditional stockholding and pre-retailing services. One important finding was that different IT systems used by different logistics providers makes it difficult for the UCC to develop a single system for handling all of them and providing visibility to the end customer waiting for deliveries, which illustrates the contention of Björklund et al. (2017) that utilizing the advantage of IT systems in designing and developing city logistics initiatives is one of the critical factors for building viable business models.

7.4 The retailer perspective on the potential for using urban consolidation centres

The findings of this study are in line with the findings of Marcucci and Danielis (2008), in that the decisions of the retailers in Edinburgh on using a UCC are not influenced by vehicle access restrictions, mainly time window restrictions, parking restrictions and loading/unloading restriction. A similar conclusion has been reached by van Heeswijk et al., (2019) in their recent study, where the authors argue that access time restrictions only aid UCCs if the time window is set sufficiently narrow. In contrast to the findings of Marcucci and Danielis (2008), the retailers do not get

affected by the distance of LUBs from their shops in Edinburgh. The retailers are not concerned with this issue due to two reasons; first, they argue that issues related to LUBs and/or parking restrictions are more of a concern for LSPs but not for the retailers themselves. Second, freight vehicles in Edinburgh can park on kerbsides for a short period of time until they complete unloading and loading of goods.

The retailers in Edinburgh, who are willing to pay for using UCC, appear to be sensitive to delivery times and risks originating from handling of their parcels. Knowing the exact time of the delivery provides operations flexibility for retailers. Using the UCC as a single point of communication (instead of trying to reach out multiple LSPs to track deliveries) produces less risk for retailers. The same retailers in Edinburgh are also more likely to use UCCs as a result of the implementation of local transport policies such as LEZ, OHD, DSP, congestion charge, parking restrictions and time-window restrictions. In line with the findings from Marcucci and Gatta (2017), the retailers in Edinburgh, which are more sensitive towards delivery times and moderately sensitive towards risk and cost show evidence that they are also influenced by local transport policies and by the operational benefits that UCCs offer.

Some of the retailers rank time savings and efficiency in logistics and delivery over the extra costs that will be paid to use the UCC and its services because they think that they can use the time as well as the effort saved from following up deliveries to improve their customer service and operational performance in general. Similar findings have been identified by Mangano and Zenezini (2019) who found that retailers are able to accept higher costs for deliveries that are more reliable and for reducing stock. The retailers in Edinburgh emphasise punctuality and flexibility in deliveries as they think that flexible and on time deliveries allow for better inventory management, higher control and in turn an improved customer service level by the retailer.

Like the findings of Marcucci and Danielis (2008), the delivery cost per parcel plays a central role in the retailers' decisions in Edinburgh. Most of the retailers preferred not paying for using UCCs because, first, they are very cost conscious due to having tight profit margins and they do not pay for their orders when they order from their suppliers above a certain quantity. Aljohani and Thompson (2018) also identified that when receivers make choices amongst different delivery strategies the cost of deliveries appears as the most important criterion, which is followed by delivery punctuality, delivery security and delivery status updates. Marcucci and Danielis (2008) found that delivery time has a major role in explaining the choice between using UCC and private transport (via LSPs) and reduction of the delivery time by half increases the UCC choice probability. The retailers in Edinburgh are concerned that receiving deliveries through a UCC would cause delays in receiving their deliveries and they usually want to receive their deliveries as quickly as possible. Therefore, delivery times appear as a factor that influences the perceptions of the retailers negatively in terms of choosing UCC over their current delivery practices.

dell'Olio et al. (2017) found that more retailers would be willing to use UCCs as the tax reductions being offered to them increase. Local taxes in addition to other variable costs (e.g., rents, the cost of goods bought) appear as one of the most important concerns amongst the retailers in Edinburgh. Small businesses are very sensitive to changes of tax rates and changes in any other cost items as they work for smaller profit margins. Retailers' sensitivity toward costs becomes a primary condition for paying to use UCCs as the retailers in Edinburgh would be willing to pay for a UCC only if they are economically strong at the time when the UCC starts its operations. This agrees with many studies that mentioned the need for financial support for operating the UCC rather than charging the users (e.g., Lebeau et al., 2017). Lebeau et al. (2017) also found that the local transport policies are not designed specifically to support the UCC but are part of a larger plan for the city such as the introduction of a pedestrianisation or an environmental zone. The findings of this study support that result as the local authority in Edinburgh does not have dedicated local transport policies that exclusively control the freight traffic in the city, and this is a conscious decision made by the authority.

Moving now from supportive policies to available services at the UCC, the study found that value-adding services have more positive influence on the retailers than the local transport policies have. This is mainly because the retailers can associate the advantages and the disadvantages of using UCCs directly and clearly by looking at the service options. Value-adding services may help them to notice the existence of solutions for their problems such as how the delivery patterns and value adding services positively affect in-store operations especially in terms of more efficient use

of space in shops and ease of managing personnel in shops (Gammelgaard et al., 2015; van Duin et al., 2016). If benefits outweigh disadvantages, retailers become more willing to pay for using UCCs. According to Marcucci and Danielis (2008) value added services such as tracking & tracing, and warehouse availability do not play a major role in explaining the choice of the retailers. The differences in this particular instance may arise due to the fact that the retailers think that the local transport policies are the concerns of LSPs and/or the retailers prefer using UCCs because value- added services may help them to overcome operational challenges, particularly during certain busy periods of the year.

As much as the retailers find value-adding services useful for their businesses and they are more likely to change their delivery systems due to these services, there is still a significant number of the retailers who think the opposite. Johansson and Björklund (2017) argue that the potential to further improve customer service at retail stores might not be achieved with the implementation of a UCC. This is mainly because of the fact that the retailers in need of extra space and/or consolidation of goods are already renting warehouse space and they are receiving tracking & tracing services from various LSPs. In the context of e-commerce support, the retailers who mentioned that this particular service is less likely to influence their decisions on using UCC do not sell their products online. On the other hand, the retailers that sell products online stated the need of having external support to handle e-commerce.

Safety of goods is one of the biggest challenges in the transportation industry. Therefore, shippers and receivers usually do not want their goods to be handled many times. It is seen as a challenge amongst the retailers in Edinburgh. On the other hand, Paddeu (2017) found that security of deliveries is extremely favoured by the users of Bristol-Bath's UCC. According to Paddeu (2017) the sense of security is closely linked to the degree of relationship between the retailers and the staff of the UCC. In the context of Edinburgh, the retailers never experienced alternative ways of receiving their deliveries and they feel safer under the current network of relationships with LSPs and there is a hesitation to break established relationships with existing LSPs and suppliers. Therefore, the retailers in Edinburgh perceives their lack of experience as a challenge for using UCCs.

The findings in Edinburgh showed that more than half of the retailers mentioned that customised delivery dates and times, tracking and tracing, distribution with electric vehicles and waste management make them more likely to choose using UCCs over their current system as long as the prices are matched. The retailers argued that these services would help with their daily planning activities as they will have a better prediction of the arrival of deliveries. Stockholding appears as another type of service that the retailers in Edinburgh considered useful. They need extra space particularly during the holiday seasons (e.g. Christmas) when the number as well as the frequency of the deliveries increase. Also, delivery with electric vehicles would help them to decrease their environmental footprint. The findings relating to environmental concerns matches conclusions from Mangano and Zenezini (2019), where the authors identified that sustainability is considered as a lever to generate more revenues especially by retailers, which are more aware of environmental issues than other sectors due to their customer facing role. However, retailers may be more concerned about safety of the delivery and the additional transport costs than the environmental benefits of low emission vehicles (Aljohani and Thompson, 2018).

Initiating UCCs and implementing local transport policies are delicate matters in the context of a city because of the positions that public authorities and retailers hold as policymakers and policy receivers. Retailers, especially when they feel their opinions are not considered and they cannot establish channels for better communication with public authorities, think that they are being treated unfairly and they do not want to support policies and/initiatives initiated by public authorities. Research shows that public acceptability is a crucial factor influencing the choice of policies made by local authorities (see first part of the thesis) and the public acceptability could be ensured through continuous consultation amongst stakeholders of UFT. Gammelgaard et al. (2015) explains this situation based on an imbalance of power, where public authorities represent an authority figure. Therefore, the process of initiating policies will have breakdowns in the process of policymaking. For successful implementation, it is necessary to have a coalition between policymakers and policy receivers. The relationship between policymakers and retailers has an effect on whether retailers evaluate new policies/initiatives as being genuinely advantageous or disadvantageous. If there is a strong bond between public authorities and businesses through easy and continuous communication, businesses will become more supportive

towards policies implemented by local authorities. The trust will lead retailers to evaluate new policies and incentives like UCCs more objectively

7.5 Synthesis of the findings

The findings from three different studies have shown that detailed knowledge of policy measures and the context in which the policymaking process takes place are necessary to improve the policy design process. This process is shaped by particular factors such as the policy context and governance dynamics, the availability of resources, and legitimacy. The policymaking process requires the link between different policy elements such as high-level policy goals, medium level policy objectives, and lowest level "on the ground" policy measures (Howlett and Cashore, 2009). Policymakers need to make sure that the chosen policy measures enable policymakers and institutions to achieve their goals and objectives. This can be achieved only if local authorities identify the individual elements and then make an action plan. An action plan should consist of realistic goals and objectives, which lead to quantifiable policy measures and targets.

The results from the studies with the UCC projects and the retailers point at critical aspects of the policymaking processes. First of all, the UCC projects in Gothenburg and Perth showed that cities with the influences such as resource availability, the support from the higher governmental agencies and legitimacy accomplish their goals and objectives more successfully than cities which are lacking these influences. The UCC project in Gothenburg has been initiated by the municipality of Gothenburg according to the Municipality's local transport goals such as improving air quality and preserving the environment. The UCC achieves these goals by decreasing the number of truck movements to the area. Less truck movements refer to less congestion and less production of carbon emissions and particulate matter. The UCC project in Perth has also been driven by particular local transport goals such as improving air quality and preserving the environment. However, the environment for policymaking has been lacking resources, legitimacy and political support. Therefore, the initiator of the project (the regional transport partnership) has not been able to identify medium level policy objectives and on the ground policy requirements. Because these objectives and requirements have been missing, the choice of policy

measure have remained unrealistic within the given context, and it has failed eventually.

Second, the study with the independent retailers showed that the understanding of UFT movements in cities is a crucial part of the policymaking process. Understanding UFT enables local authorities to establishing links between the policy elements. The first study on local authorities identified and the study with the retailers confirmed that the implementation of policy measures in Scotland does not consider UFT specific objectives and they have not been designed to reflect specific requirements of the parties which are involved in UFT. Even though the policy measures such as kerbside parking restrictions and time window restrictions have been relaxed for delivery vehicles, the same rules do not apply to retailers' own private vehicles. The lack of dedicated LUBs, the lack of enforcement on the misuse of the existing LUBs, and varying time window restrictions have been identified as significant problems that cause impediments in deliveries to retailers' premises. These problems occur because local authorities do not check on the policy requirements periodically and revise the existing policy measures according to altering "on the ground" requirements. This leads back to the shortcomings of local transport plans, where local authorities do not aim to identify UFT related objectives as a part of their local transport goals.

Policy measures will affect all stakeholders involved in UFT directly or indirectly. The cities that implement more complicated policy measures (e.g. UCCs, OHDs, LEZs) show evidence of closer collaboration with other stakeholders such as other public authorities, associations, partnerships, retailers and LSPs. When local authorities have a direct correspondent within their organisations who works with UFT, they seem to be more open to collaborations with internal and external stakeholders. The UCC projects showed that stakeholder collaboration is a crucial element of successful projects. During projects such as public-led UCCs, at least three stakeholders should be able to make long term financial and operational commitments; first, local authorities should bring a detailed plan of policy measures that they aim to implement in collaboration with multiple stakeholders. Second, potential users (forming the demand base) and an operator (operational excellence) need to be willing to invest in the implementation of policy measures.

FQPs, the combined authorities, and projects such as EU-funded projects bring more resources and stakeholders together to enable the implementation of policy measures. As a result, the resource availability, and legitimacy gained through projects and partnerships may guarantee the long-term success in implementing policy measures with quantifiable results. Communication is a determining factor in how policy measures are being embraced by different stakeholders. The study with the retailers showed that the retailers are willing to accept restrictions and exemptions in related to the use of UCCs when they think their needs and requirements are considered by the local authority. Regular communication with stakeholders is another factor that needs to be a part of policymaking in UFT. Retailers and LSPs request communication on a regular basis through legitimate platforms such as stakeholder meetings.

Public authorities may overlook logistics related needs of different stakeholders while choosing and implementing policy measures. All three studies showed that logistics (specifically UFT) is not a part of local transport plans; however, the changing trends should be noted in local authorities' approaches to involve UFT as a part of their transport strategies. There are multiple factors driving this change. The importance of understanding UFT increases constantly because the flow of goods to cities are increasing due to retailing deliveries, home deliveries and returns. Cities are adopting SUMPs, which acknowledge freight as a component of urban mobility. Collaborative projects (e.g. City Logistics in Living Laboratories, Smartset and ENCLOSE) based on public and private partnerships have become widespread. The funding from national (e.g. national authorities) as well as international bodies such as the EU help public authorities to initiate collaborative projects which help to increase awareness of UFT.

Projects, SULPs, SUMPs, and surveys targeting retailers and LSPs are useful tools to collect data for identifying needs and requirements of other stakeholders. The lack of data is one of the significant problems identified in the study with the local authorities. Data collection is crucial because, first, it helps to identify problems and describe trends of UFT in cities; second, data can be used for informing evidence-based policymaking. There are two major challenges that public authorities are facing. As identified in the first study, local authorities do not have dedicated financial and

human resources for UFT. Second, LSPs obtain freight data, which could be valuable for public authorities to make informed decisions in policymaking processes; however, this data is commercial and confidential. Therefore, projects and national funding opportunities can enable local authorities to work with private companies in closer collaboration and local authorities can obtain resources to dedicate to develop their processes in policymaking in the context of UFT.

LSPs play a vital role in freight transport on urban scale. They are the source of supply of some essential services such as delivery and warehousing. Even though this thesis did not specifically focus on LSPs, it is still crucial to discuss their role in UFT, particularly in the context of local transport policies, and UCCs. LSPs deliver substantial amount of goods on a daily basis to various points (e.g., other businesses, households). LSPs are affected by local transport policy measures significantly as timing of deliveries get affected by the measures such as by time window restrictions, the lack of dedicated LUBs and parking restrictions. In addition, delivery vehicles are affected by other policy measures related to access conditions such as LEZ, congestion charge, and size restrictions (e.g., weight, height). Local authorities need to know type of LSPs providing delivery services frequently in their cities and they need to be in regular contact with representatives of LSPs to communicate any significant change that will take place in policy measures. Public-led UCCs can obtain benefit from the participation of LSPs as users of UCCs. The case studies undertaken in this thesis showed that UCCs benefit from collaborating with LSPs as operators and as users. LSPs as operators bring experience in using the most efficient tools and techniques for consolidation and delivery. LSPs as users can provide the demand base which is required for a UCC to become profitable even after the funding provided by public authorities ends In other instances, LSPs might prefer opening and running their own UCCs and it can pave the way to contribute to cities' sustainable development plans in another way. Even though LSPs are efficiently consolidate their goods beginning from earlier stages of their supply chains, local policy measures or altering patterns of demand (e.g., extremely dispersed deliveries and under-utilised vehicles due to deliveries caused by online shopping) might force LSPs to set-up their own centres.

Data on retailers' and LSP's needs and requirements is also crucial when local authorities initiate policy measures such as UCCs. Consolidation centres in urban

areas can be designed to provide logistics services that will respond these stakeholders' needs and requirements such as consolidation for last mile deliveries, additional stockholding, return and waste management, tracking and tracing, preretailing services, and e-commerce support. The study with retailers showed that these services become particularly useful in the context of independent retailers as they have limited physical resources and human resources while running their businesses. The study analysing the UCC projects in Gothenburg and Perth proved that service development requires close working relationship between stakeholders, especially when operators are small and local service providers rather than big-scale LSPs. Public authorities together with operators of UCCs play a key role in identifying altering needs of users and to create resources to ensure the financial viability of UCCs.

Local authorities are the main level of public authority in the execution of UFT policy measures. Local authorities lead the policymaking processes and they also play a mediating role. Local authorities enable the collaboration between different governance scales (e.g. national, regional and combined authorities) as well as within the departments. For instance, the implementation of LEZs (aka environmental zones in Sweden) is decided by the national authorities and the policy measure is enforced by local authorities. It means that local authorities need to be able to analyse the needs and requirements of various road users based on evidence for a successful implementation of the policy measure.

7.6 Summary

This section has first discussed the findings from the individual studies. Later, the discussion has focused on synthesising all findings and making the connections between the results from three distinctive but related studies. Policy context and governance dynamics, resource availability, and legitimacy have been identified as the main influences on the choice of policy measures. These factors also influence to what extent local authorities can successfully establish the link between high-level policy goals, medium level policy objectives and policy measures with respect to UFT. Identification of stakeholders and enabling a healthy collaboration between public and private organisations lead local authorities to identify UFT-specific policy objectives and policy measures. In this way, the policy measures serve their purposes in

regulating UFT without constraining efficiency and effectiveness of logistics activities. Understanding the dynamics of logistics activities is a prerequisite for the implementation of correct policy measures that responds to the needs of businesses and LSPs. In order to keep different subjects of local transport networks, local authorities need to acknowledge that they have a mediating role in ensuring the inclusion of UFT as a part of local transport strategies like other subjects (e.g. public transport, urban mobility). Despite the fact that it requires tremendous effort from local authorities, they should create dedicated resources to implement UFT policy measures and to implement them successfully.

8.1 Research summary

The aim of this thesis is first to understand the impact of policy actions taken at the local level on the viability of UCCs and to analyse the disaggregation process in choosing and implementing policy measures for UFT at the level of local authorities by specifically focusing on three aspects: the influences on the UFT policy choice, the use of UFT policies to support the development of UCC projects, and the effect of UFT policy implementation on retailers perceptions of using UCCs. The framework of Howlett and Cashore (2009), which argued that policies are not just measures implemented "on the ground" but form a chain from high-level goals down to practical measures, give this thesis its direction to fulfil its aims. Each of the aforementioned aspects formed a basis for the following research questions:

- 1. How do local authorities seek and select local transport policy measures to regulate urban freight transport (UFT)?
- 2. How do supportive UFT policy measures work in conjunction with stakeholder collaboration to support successful public led urban consolidation centres (UCC) developments?
- 3. How do supportive UFT policy measures affect the willingness and the perceptions of retailers in using UCCs for their last mile deliveries?

Chapter 2 presented the literature review, which defined the key issues to be addressed on all three aspects. The literature review helped to structure the interview guide for data collection and structure the data analysis. To answer the research questions, case studies were used in this research. The justification for the chosen methodology, the tools for data collection and the steps of the data analysis were presented in Chapter 3. The findings from this research were presented in chapter 4 (the results from 11 case studies), chapter 5 (the results from two in-depth case studies), and chapter 6 (the results from a single case study in Scotland) respectively. Later, all findings from the individual chapters were gathered in chapter 7 and they were discussed based on the disaggregation process in choosing and making UFT

policies in the context of local authorities and related to previous literature. Finally, this chapter will present the theoretical and the practical contributions of this thesis. It will be followed by reflections on the methodology and the limitations of this research. The chapter will conclude with suggested avenues for further research.

8.2 Answering the research questions

The following research questions facilitated to address the aim of this research. The questions are answered as follows:

1. How do local authorities seek and select local transport policy measures to regulate UFT?

The aim of this question was to investigate the process of policymaking in local authorities. The analysis was comprised of multiple facets of policymaking in the context of UFT. A multiple-case study design was implemented to investigate organisations and policy settings at different governance scales, policy and strategy documents, policy targets, policy measures, and the influences on UFT policy choice such as policy context and governance dynamics, resource availability and legitimacy. The set of cases consisted of 11 cities in Scotland, England and Sweden.

The first finding from this study is the identification of policy goals and measures across the case cities. The cities have identical goals. These goals focus on environmental protection, economic growth, reducing congestion, enabling safe and secure transport and creating vibrant and attractive city centres. In terms of policy measures restrictions are the most common type of measures such as time window restrictions and size restrictions. In addition, Swedish cities are more likely to choose interventionist measures such as congestion charges and LEZs whereas more voluntary measures such as vehicle recognition schemes are preferred in Scotland and England. Only a limited number of the cities measure the performance of the policy measures by using KPIs. All case cities measure emission levels for the entire traffic activity. Only very few cities analyse emission or traffic levels with respect to freight vehicles. The other most common targets are the number of road casualties, journey time reliability and level of traffic on local roads and trunk roads, but these are difficult to link with specific policy measures.

Second, some factors have been identified that influence the choice of policy measures and the policymaking processes. Policy context and governance dynamics, resource availability, and legitimacy have significant influence on how local authorities seek and select UFT policy measures. A significant interrelation between the three types of influence was identified and to some extent resource availability underpins all of them. Availability of resources such as funding allows the hiring of dedicated personnel, which in turn provides the ability to increase integration with other policy areas (policy context and governance dynamics) and to interact with industry and citizens (legitimacy).

Each influencing factor is characterised by sub-groups of factors relating to collaboration, land use planning, role of non-freight transport policies, financial resources, dedicated UFT personnel, participation in externally funded projects, the relationship with other stakeholders such as businesses and LSPs, and finally the public acceptability. The majority of the local authorities consider collaboration between public authorities and private stakeholders as essential. Interdepartmental collaboration was identified as influential as the collaboration between public authorities and private stakeholders on the choice of UFT policy measures. The collaboration between different departments was found to be important due to several reasons. First, all relevant departments should work together when there is a new project, which requires land use planning, is initiated. This is mainly because new development sites should be accessible by all modes and the design of transport networks is an important element of accessibility. Second, collaboration increases awareness regarding freight in cities and the potential impacts of other non-freight transport policies on the choice of UFT policy measures.

Resource availability has been identified as one of the key reasons of why UFT is given a very limited place in local transport planning. Lack of financial resources is the main reason why so many local authorities do not have dedicated UFT personnel or why some local authorities are not able to measure their KPIs in order to monitor their policies' performance. UFT resources are more seriously limited in English and Scottish councils compared to Swedish municipalities. There has been a recent change in governance of local authorities in England, creating combined authorities which can obtain more power and resources for the cities involved. Lately, the local authorities

have been participating in the project calls, which investigate UFT in cities. The main reason of the project participation is twofold; first, the local authorities want to gain an understanding of UFT and how logistics systems work in cities. Second, they want to bring resources to the local authorities in order to dedicate time and human resources for implementing UFT focused policy measures.

2. How do supportive UFT policy measures work in conjunction with stakeholder collaboration to support successful public- led UCC developments?

The previous research question gave a broad overview on the issues associated with the choice of policy measures and the influences on the choice of the UFT policy measures in 11 cities. The findings from the case studies in Chapter 4 motivated the choice of the case studies for answering the second research question. The aim of the question was to analyse the supportive policy measures which enable successful development of public-led UCCs in conjunction with stakeholder collaboration. The methodology was a multiple case study approach, comparing two cases in Sweden and Scotland.

The key findings from this study show that supporting policy measures for UCCs cannot be considered in isolation from the UFT policy setting established by the local authority. UFT policy measures (from the most common to the least common) such as time window restrictions, size restrictions, congestion charge and LEZs were identified as the most popular and effective policies in the city centre that can support successful implementation. These measures work best not as new policy measures but when put in place already by a proactive local authority.

Supporting policies were evaluated in three categories as identified by Lebeau et al. (2017); they are financial support, direct regulatory support and indirect regulatory support. Significant differences between the two cases were identified that directly affect the success of the projects. Clearly the start-up finance was essential, reflecting the challenges of attracting paying users. To avoid increasing costs for users and to attract an operator, the Swedish project was subsidised by public money beginning from the early stages of the project and the support was decreased gradually as the UCC started to generate revenues. Indirect financial support was available in

Perth via an EU-funded research project that paid for the feasibility studies. Direct regulatory support was provided (or planned) in both cases via favourable measures to the UCC operator e.g., exemptions from the restrictions in pedestrianised areas.

Another key difference was in the indirect regulatory support, which is where the list of supportive or other UFT policies can be used in conjunction with the UFT. It must be remembered that such restrictions are not necessarily directly for the UCC but are sometimes put in place regardless. In the Gothenburg case, the local authority implemented time window restrictions and LEZs before the UCC was established and after the UCC started to operate. Later, the local authority continued to implement other policies such as weight restrictions and congestion charge. In Perth such policies would have had to be newly implemented. This supports the importance of understanding the public authority role and linking the wider UFT policy setting with the individual UCC development.

Stakeholder collaboration is the other key aspect that supports the implementation of UFT policy measures for UCCs. While public authorities and private companies often have different perspectives, it is possible to develop successful projects together when they are aware of the potential consequences as well as benefits of UFT policies. Crucially, stakeholder collaboration should evolve over time for successful implementation of UCCs. Thus, improving the general UFT policy setting by the local authority and particularly the collaboration between the public and private sectors are essential steps that should be taken before attempting such an undertaking. Once this improved environment and more active management of UFT is in place, a UCC development may be contemplated. While the results of the case studies showed that policy measures made the UCC more attractive, even the best policies would not have been sufficient to establish the UCC without the start-up subsidy and the understanding of UFT developed by the public authorities over some years.

While the main focus of this research question is on supportive UFT measures and stakeholders' collaboration, other contextual factors were identified as they are relevant to successful developments of UCC projects and they influence (and are influenced by) the use of supportive policy measures and stakeholder collaboration. Financial viability, the need for political support and operational obstacles (e.g., lack of delivery schedules, lack of information system infrastructure, losing first contact with the customers) were identified as the main challenges to the development of UCC projects. Financial viability is the obvious challenge, due to a lack of customer base and usually requires political support via public subsidy to overcome. But this challenge arises in effect from the operational challenges that deter users.

The second contextual factor consists of service offerings that UCCs can provide to be more attractive or raise additional revenue. Value-added services and the use of electric vehicles are widely discussed in the existing literature such as preretailing services, waste management, e-commerce services and stockholding. The UCC in Gothenburg offered electric vehicles and e-commerce services and later developed another revenue stream via using their electric vehicles for advertising. The Perth UCC was also planning electric vehicles as well as the more traditional stockholding and pre-retailing services. One important finding in the case of Gothenburg was that different IT systems used by different logistics providers makes it difficult for the UCC to develop a single system for handling all of them and providing visibility to the end customer waiting for deliveries.

3. How do supportive UFT policy measures affect the willingness and the perceptions of retailers in using UCCs for their last-mile deliveries?

The last research question of this thesis aimed at identifying the effect of supportive policy measures on retailers; willingness to use UCCs and perceptions on the implementation of the policy measures as a mechanism of support. A single case study was designed. Edinburgh was chosen as the case study, where the data was collected from individual retailers selling non-perishable goods. This study investigated how retailers react towards using UCCs to receive their deliveries when public authorities implement these policies which will intervene with their activities and influence the performance of their deliveries and the relationship with their suppliers and LSPs. The retailers' decisions are influenced by their current experiences with the existing local transport policies. In general, local transport policies do not change the opinions of the majority. If the current policies are not directly affecting their service levels and operational performance, they are less likely to use UCCs. If new restrictive local transport policies were introduced and/or the existing policies become more restrictive, two possible reactions were identified.

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In most cases, the retailers would still not want to use UCCs because they think that LSPs are the stakeholders which are affected the most by the consequences of local transport policies. On the other hand, the retailers may be willing to use UCCs when local transport policies cause higher operational costs than the cost of using UCCs. Retailers make these decisions by considering delivery security, timing of deliveries, and the degree of their relationships with LSPs as well as local authorities. They look at the implications of these issues on their total costs of doing business. When retailers see more challenges in using UCCs than they see benefits, they will not be willing to use UCCs. However, they may in some cases be willing to pay the UCCs to provide services for which they currently pay their LSPs. Value-added services such as stockholding, waste management and recycling, e-commerce support, and customised delivery date & time appear to have a stronger influence on retailers' decisions than local transport policies, as the positive effects of these services on operational efficiency can be higher than the negative influence of the policies.

One of the most important findings is related to retailers' lack of information and opinion about local transport policies and their lack of attention to the urban freight system that operates outside of their shops. For the most part, the retailers do not have opinions about local transport policies, and the implications on their businesses, if any. The retailers either have very limited communication with local authorities or none. Moreover, they do not see any reason to change their relationship with public authorities. The retailers are concerned more about the potential challenges that UCCs would cause. Yet, even considering the potential benefits of using UCCs, some retailers do not want to pay for using UCCs under any circumstances. One key finding is the importance of the role of LSPs in linking the retailer with the UCC, therefore for a successful transfer to a UCC model, the retailer, LSP and local authority would need to work together.

8.3 Contribution to the literature

The research topic that was investigated in this thesis is based on the framework of Howlett and Cashore (2009), which argued that policies are not just measures implemented "on the ground" but form a chain from high-level goals down to practical measures. Each element of a policy should be considered in detail in order to implement accurate policies. Previous research (Marsden et al., 2014; Monios, 2016) has suggested that the link between goals (more abstract, higher level elements) and adopted measures (least abstract, practical mechanisms) is frequently not strong enough when policymakers construct policy goals and select measures. Marsden and Reardon (2017) showed that almost the entirety of academic papers on transport policy focus on the implemented measures rather than the link between measures and goals. In this thesis, the topic was investigated through a case study methodology. The topic was investigated in three sections through 14 case studies (11 case studies in Chapter 4, two case studies in Chapter 5 and a single case study in Chapter 6). The overall aim of adopting these case studies was to analyse the phenomenon of disaggregation in the local policy context. Each research question and results chapter approached the problem from different angles. This section first will discuss the findings of each chapter's contribution to the literature and then the contribution of the thesis will be discussed under the umbrella of policy disaggregation.

The contribution of the first section is made in the area of policymaking and the choice of policy measures in local authorities in the context of UFT. The findings of this study confirm previous studies (e.g. Kiba-Janiak, 2017; Lindholm and Blinge, 2014; Lindholm and Browne, 2013) highlighting that UFT has been given limited attention in local transport planning in many cities which primarily focus on public transport and infrastructure investments. The contribution of the findings focuses on two main issues: First, it is identified that the policy process is not disaggregated; therefore, there are inconsistencies between the goals and the policy measures which are currently implemented. These inconsistencies arise due to lack of identifying specific objectives, which can also lead local authorities to identify on-the-ground requirements for choosing and implementing particular policy measures. Second, local authorities need to be aware of a set of factors that influence the choice of policy measures and they should focus on filling these gaps.

The following influences were identified and proposed as a contribution to the existing knowledge. The influences are the availability of resources (particularly funding), the integration with other policy areas (policy context and governance dynamics) and the development of the interaction with industry and citizens (legitimacy). These findings could easily be transferred in the other areas of local

transport planning as other areas of transport policy (e.g. implementation of bus policies) are suffering due to lack of structured way of implementing policy measures.

Findings from the second section of the thesis contribute to existing knowledge by demonstrating the importance of understanding the divergent perspective of all stakeholders, notably the concerns of logistics providers losing direct control of their last mile solutions, and the importance of the public authority building a collaborative UFT policy environment before attempting a UCC development. Crucially, this involves designing supportive policies for the city in general and not just for the UCC, but also committing to financially support the UCC over at least the medium term, allowing time for the system to mature and collaborative service offerings to be developed. When this research started there were only a few papers investigating the use of policy measures together with the implementation of UCCs and even fewer studies looking at the use of policy measures as a means of support to implement successful UCC projects. Browne et al. (2005) is one of the earliest studies aiming to investigate the potential for the development of UCCs. This study found that UCCs are more likely to be successful when introduced together with other policy measures such as vehicle access restrictions as a policy package.

Marcucci and Danielis (2008) identified that the participation in UCCs is influenced by the factors like access permit cost, service cost of the consolidation centre, delay in delivery time and distance to the shop. Later, Panero et al. (2011) reviewed 39 UCCs to identify contextual settings (e.g., policy and governance) and key characteristics that make UCCs successful. However, there were still more questions to explore such as what type of policy measures offer the strongest support to initiate viable UCCs and what factors enable the successful implementation of the supporting policy measures such as stakeholder collaboration and the challenges of initiating UCCs. In the meantime, there have been more studies published on the topic of UCCs, but the findings of this study nevertheless reveal insights about how local authorities have been/have not been able to disaggregate the policy elements for implementing policy measures efficiently without jeopardizing scarce resources and reputation. Allen et al. (2012) reviewed various UCC projects all around the world and concluded that projects would be successful in the long term if leading organisations have a strong influence on other stakeholders and if they can control the various parameters such as the implementation of policy measures. The most popular policy measures for supporting UCCs were loading time restrictions, size restrictions, permission to access to other dedicated lanes, and pedestrianization.

This second part of the study makes another contribution with the type of UCCs that were adopted as case studies. When this thesis was proposed in 2015 there was no study focusing on investigating the UCCs in Gothenburg and Perth. Until this date, this is the only study which investigated the development of the UCC in Perth. In particular, Scotland with many thriving cities like Edinburgh, Glasgow and Aberdeen were given little attention. The case provides additional value because it studies a failed case which can be more revealing than a successful case. The findings of this study also make an attempt to fill this gap by bringing a new perspective in the discussion of UFT through analysing the dynamics of local authorities in Scotland.

The findings from the third research question contribute to existing knowledge first by extending the investigation of the role of local transport policies in persuading the use of UCCs amongst small and medium sized individual retailers. Studies that investigate UCCs from the perspective of individual retailers remain limited due to several reasons. First, the number of successful UCCs is limited and many projects have failed after stopping public funding (Allen et al., 2012; Bram et al., 2016). Second, the majority of the successful UCCs serve shopping centres, construction areas and/or airports (Allen et al., 2014) or the customer base consists of LSPs (van Rooijen and Quak, 2010; Holguín-Veras et al., 2016) ; but not the individual retailers, which are scattered all around cities. Third, there is a considerable amount of studies that focus on finding optimal solutions and designs for potential UCCs with very little consideration to financial viability and the management of UCCs (Björklund and Johansson, 2018). Considering deliveries to retailers' premises have substantial environmental and economic impact on cities, this study helps to increase the understanding of the conditions that are required for being able to implement UCCs for retailers in combination with supporting policy measures.

Moreover, the design of this third part of the study (single case study design based on a high number of interviews) leads to investigate multiple factors that influence the choices of the retailers concerning their delivery systems. The findings revealed that the local transport policies do not currently exert much influence on retailers' decisions towards using UCCs. It was identified that these UFT policies do have the potential for influence, but the effectiveness of individual local transport policies and their combinations depend on other factors such as retailers' perceptions of benefits and challenges of using UCCs, the degree of relationship between local authorities and retailers and the impact of value-added services. Finally, all these factors impact the wiliness to pay. This study is different to existing studies because it investigates the relationship between the aforementioned factors and how these various factors impact upon the retailers' willingness to use UCCs to replace their current delivery systems. Thus, this study complements existing studies because there are various studies focusing on the aforementioned factors individually and this study presents evidence of how these factors are related to each other and how they interact collectively.

The overall findings of this thesis make its contribution to knowledge by investigating and explaining the impact of policy actions taken at the local level on the viability of UCCs. All three parts of the thesis contribute to this overarching finding, with each part building on the previous sections. The study on UFT policies in 11 cities showed that some cities such as Gothenburg, Stockholm, and Bristol are more experienced in dealing with UFT. Cities with expertise can achieve the disaggregation in choosing and making policies for UFT. Swedish cities are the most advanced ones in this process whereas Scottish cities are the least developed cities in the disaggregation of policy elements. All case cities have similar goals, but only more advanced cities can accomplish these goals with UFT specific objectives, and policy measures.

The lack of dedicated and measurable targets for UFT is a common issue amongst all 11 cities. However, some cities such as Gothenburg, Stockholm, Bristol started to construct targets to evaluate the effectiveness of the policy measures in place. Other cities such as Greater Manchester and Malmö constructed UFT focused targets because these cities want to coordinate UFT related activities more efficiently. The cities that go after the identification of measurable targets show better performance on disaggregating the policy elements. The findings of this study also show that influences such as governance dynamics, role of non-freight policies, resource availability and legitimacy become either enablers or barriers of the process of disaggregation. The UCC in Gothenburg proved that when local authorities are able to break up their higher-level goals (e.g., protecting the environment) into specific policy objectives (e.g. decreasing level of emission, decreasing congestion, decreasing the number of vehicles entering the city centre), they anticipate what type of policy measures would be needed to achieve their goals and specific objectives. Identification of these objectives enabled the local authority to analyse the on-the-ground requirements of the policy measures such as time-window restrictions as well as the need for funding and the need for collaborating with various stakeholders to establish a viable business model.

After the local authority in Gothenburg decided and implemented the UCC, they realise that the existing policy measures (as well as the exemptions from these policy measures) can support the viability and the use of the UCC. Therefore, they initiated further plans to implement other policy measures to achieve their objectives and goals. The study of 30 retailers in Edinburgh showed that understanding retailers' logistics operations, the impact of policy measures on their operations, and the relationship between public authorities and retailers are key factors to successful implementation of policy measures. Understanding the key factors is also important for the acceptability of the measures by wider audience such as individual retailers. The findings showed that the current UFT policy measures in Edinburgh and how they are formulated (e.g. strict and various time window restrictions, lack of LUBs,) cause disturbances in retailers' logistics operations directly and indirectly. This is the evidence that the local authority is lacking to identify on-the-ground requirements for implementing policy measures. The lack of the investigation of requirements indicates that the local authority does not have specific objectives that facilitate the implementation of policy measures, which will not produce inefficiencies while regulating freight transport. The results showing the relationship with policymakers indicate that the local authorities do not evaluate impacts of policy measures on retailers' delivery operations. There is no evidence that the local authorities identify targets and measure the performance of existing policy measure accordingly, which also confirms the findings from the first of the three empirical sections.

8.4 Contribution to policy decision-making

This thesis also results in practical contributions which would be particularly useful for policymakers in public authorities. The findings of this thesis also become relevant to the other stakeholders such as LSPs and retailers. These findings could be used by different stakeholders to understand perspectives of other stakeholders, which could trigger better collaboration and communication amongst these parties who have conflicting objectives. The first section of results highlighted some lessons for UFT policymakers. First, where it is not already happening, local authorities must increase opportunities for learning from and collaborating with the private sector. Second, if not in place, dedicated personnel for UFT are essential to provide a clear point of contact, knowledge development and policy champion to pursue UFT goals. Third, an increased focus on collaboration with other departments, including land-use planning, and non-freight policy areas such as pedestrianisation, but this in itself can be achieved more effectively with dedicated UFT personnel, which in turn requires financial resources.

The lessons learned from the second study presented some key elements for public authorities to initiate successful UCC projects and how UFT policy measures can support the development of successful projects. Using policy measures as supporting mechanisms require detailed planning and initiating collaboration with various stakeholders. First, stakeholders (e.g., retailers, LSPs) should be familiarised with UFT policy measures prior to the introduction of UCCs. Local authorities should introduce policy measures such as time window restrictions to prepare stakeholders for changing conditions for delivering freight. Later local authorities should make a commitment to financially support the UCC over at least the medium term.

Last but not the least, local authorities should collaborate with local and global stakeholders (e.g., LSPs and retailers) to establish the sufficient demand base as public funds will not be provided forever. Such collaborations can be established efficiently when local authorities communicate with organisations such as chambers of commerce, retail associations, road freight associations, and FQPs. The findings of this study showed that collaboration with these organisations and/or similar organisation have benefits for all stakeholders when regulating UFT. For instance, both public authorities and other organisations find the chance to communicate

through platforms such as FQPs and they communicate their problems and requests easily. One important recommendation for public authorities is that they need to seek for establishing platforms to facilitate communication if they want to ensure the successful implementation of policy measures and projects.

Both public authorities and private organisations can learn from the findings of the third study which was completed with the retailers in Edinburgh. First, the findings provide insights about the retailers' logistics challenges occurring due to local transport policies. This information may help local authorities to implement new policies or redesign existing ones based on the needs of retailers. Second, given the current lack of relationship between retailers and local authorities, the latter could strengthen their communication with local businesses via paying attention to their particular needs and they may gain support when they want to implement substantial changes like introducing UCCs or delivery service plans. Third, this study highlighted the importance of understanding the role of the LSP, but this role remains underresearched, partly due to difficulties in obtaining data.

8.5 Reflections on the methodology and limitations of the research

Qualitative case studies have been chosen as the methodology to investigate the thesis topic. The details about the choice of the methodology, the approach as well as the limitations of case studies have been discussed in Chapter 3 in detail. This section will reflect on the issues that the author of this thesis came across while designing the case studies and investigating the thesis topic. Case study research always faces some limitations in terms of generalisability. Confidence in generalisability depends on the rigour of the methodology, including the traceability of the research process, which, from the formulation of problems to the dissemination of results should as far as possible be accountable and traceable by readers (da Mota Pedrosa et al., 2012). As described in the methodology section, this traceability was ensured by documenting the research process and the data sources, the selection of cases, informants and data collection techniques, which can enable the reproducibility of the research process by other researchers. The number of cases is another point that relates to the concerns of generalisability. Eisenhardt (1989) argue that although there is no ideal number of

cases, a number between four cases and 10 cases may generate desired outcomes for building theories from case study research.

The first study consists of 11 case studies. One of the concerns that Eisenhardt (1989) raised that if the number of the case studies exceed 10 cases it becomes challenging to manage due to its complexity and its volume. The volume of the data that have been collected for the first study was high. A set of categories have been produced as a result of a detailed review of the literature as well as the policy documents. These categories have formed the basis of the interview guide. The same set of categories has been used for analysing the data, which help to reduce the complexity of dealing with the high volumes of data. One shortcoming about this study is that it has included only the big cities (in case of Scotland and Sweden, the study consisted of the biggest cities) from each country, which could limit the generalisation of the findings. Considering the availability of the resources and time available for conducting the study, the author of this study believes that the chosen cities were sufficient to generate meaningful results and make theoretical contributions. This particular study can pave the way for conducting another round of research on the same topic in medium and small size cities in the same countries.

In the case of the second study that has focused on the UCCs, previous case studies discussed in the literature review demonstrate their importance in understanding the challenges in UCC development, especially from a qualitative perspective, such as reluctance from users and interaction between public bodies and industry. The two cases selected for this research were purposely selected as similar, both led by public authorities, aimed at serving retailers in pedestrianised zones where time windows restrictions are implemented. Comparing one successful and one unsuccessful case enabled interesting comparisons that would not be possible in many studies that focus only on successful cases. In terms of findings, the main factors impacting the different results for each case were related to policy and stakeholder collaboration, and it is these findings as regards the policy environment that can be generalizable from city to city. However, this study comes with certain limitations such as number and characteristics of the cases. First, this study focuses on two cases. If the number of the cases were increased, this would improve the generalisability of the results. Second, this study only focuses on public led UCCs. However, the dynamics of stakeholder collaboration and the type of policies that appropriately support the development of UCC projects may be different for private-led UCCs.

The third study focused on a single case. There are certain shortcomings of using a single case study despite the fact that the sample of the retailers provided a rich detail and helped to draw meaningful conclusions. The main concern is related to the generalisability, which is limited in the case of the third study because only a single city has been investigated. Considering the findings from the first study, there are differences amongst the Scottish cities with regards how local authorities treat UFT and how they implement UFT related policy measures. Therefore, the perception as well as the experience of retailers in other Scottish cities could be different.

8.6 Recommendations for future research

The studies on freight transport in cities as well as on UCCs have expanded during the course of this research and many papers have been published. Few papers had been published when the topic of this thesis was formulated in 2015. Some foundational papers were published well before this thesis was formulated and these studies contributed to build the theoretical background to this thesis. Browne et al. (2005) and Allen et al. (2012) presented two of the foundational studies in the area of UCC via reviewing existing UCC projects to date and making propositions for viable business models for future UCCs. These studies also acknowledged that various local authorities may implement and/or have already implemented policy measures to support UCCs via restricting the traffic flow in areas, which UCCs would serve.

Some recent papers have studied the topic examined in the first part of this thesis on how UFT is being considered by local authorities with respect to policymaking. Their findings confirmed the thesis results, namely that the local authorities in Europe still struggle with regulating UFT effectively in cities. Lindholm and Blinge (2014) analysed the state of policy and planning in the context of UFT in local authorities in Sweden and found that there is the lack of coordination, sufficient resources, and effective knowledge transfer among stakeholders in UFT. The authors recommend further studies to analyse the development and trend in UFT by local authorities. Later, Kiba-Janiak (2017) analysed policy and planning to create long term UFT plans in 12 European cities and applied the maturity concept to identify what

extent the cities are involved with planning and implementing UFT. The author found that the cities are lacking long-term transport plans that concentrate primarily freight transport and rather they focus on public transport and transport infrastructure.

Future research needs to continue investigating the developments of UFT strategies and policy measures at the local authorities. The research can be developed in various directions. For example, the disaggregation of policy UFT elements can be further investigated through surveys. Such surveys will be useful to be disseminated to a larger sample, which can involve small and medium sized cities from Sweden, England, and Scotland. Other parts of the UK should be investigated such as Wales and Northern Ireland. Devolved governments and public authorities show differences which significantly influence the methods to be used to regulate UFT. Effects of EU-funded projects on the development of UFT strategies and policy measures at local authorities can become another potential topic for further investigation.

During last 15-20 years, there is a noticeable increase in the number of EU funded projects that focus on UFT. These projects have brought public and private organisations as well as universities together. SURFLOGH, PROSPECTS, PORTIS, STRAIGHTSOL and Smartset are some of the projects that bring various stakeholders together to develop innovative UFT policy measures and transport strategies. Since local authorities often are lacking financial and human resources to dedicate to the implementation of UFT policy measures and strategies, project involvement can help them to tackle this issue by receiving help from universities.

Most of the research in the context of UCCs focuses on investigating how successful business models can be established for UCCs as the existing concepts are highly dependent on public money and investments from other organisations. It becomes an additional step in supply chains and increase the cost of deliveries for final customers. Lagorio et al. (2016) and Björklund and Johansson (2018) argue that there is a need for considering the following issues: more research focusing on ways of stakeholder collaboration, the need for the use of primary data not through replicating existing studies but through identifying new instances, and the need for a holistic approach in the analysis of UCCs. Panero et al. (2011) and Lebeau et al. (2017) paved the way for having more holistic approach in the analysis of UCCs via investigating
how public authorities supported UCCs with different types of accompanying measures.

The focus of the UCC studies in this thesis identified the role of supporting UFT policy measures in combination with stakeholder collaboration in the case of successful and unsuccessful project. A more holistic approach has been emphasised through investigating the challenges of establishing UCC projects and how other financial mechanisms (e.g., service offerings) work to overcome the challenges and have been enabled by stakeholder collaborations. Future research can be guided by the findings of this study. First, the study design could be replicated in more cities. More studies from different cities and countries will contribute to the generalisability of the findings. Another area for future research may focus on the investigation of the role of supporting policy measures not only in the context of UCCs but the topic should be elaborated to understand how the implementation of particular policy measures support the use of particular initiatives that are environmentally sustainable such as the use of parcel lockers, the use of public transport for delivering freight, the implementation of OHD, and the use of autonomous vehicles in UFT.

The research on UCCs is diverging from solely elaborating successful businesses models to investigating different aspects of UCCs such as analysing UCCs as a concept of relationship platforms for value creation (Gammelgaard et al., 2017), financial viability of UCCs (Janjevic and Ndiaye, 2017; Estrada and Roca-Riu, 2017), retailers' willingness to participate UCCs (Marcucci and Danielis, 2008; Holguín-Veras et al., 2016; Marcucci and Gatta, 2017; dell 'Olio et al., 2017), and retailers' experiences in using UCC. Lagorio et al. (2016) identified that the majority of previous UCC projects in Europe focused on freight carriers in the initiation of consolidation systems. The power of the retailers on UFT with respect to delivery requirements is significant. The impact of their deliveries has substantial environmental and economic impact on cities. In their studies, Aljohani and Russell (2019) stress the importance of investigating the influence of receivers' business characteristics on their preferences in inducing changes in their current deliveries to promote the consolidation of their deliveries. Apart from retailers, LSPs should be included in the investigation of business models for UCCs. The further research can

elaborate LSPs' perceptions on using UCCs with respect to other local transport policies. LSPs are one of the key stakeholders in the context of UFT. They perform main delivery activities in cities and as a result, they get affected by local transport policies extensively. The examples elaborated in this thesis (Stadsleveransen) and other examples from the literature (van Duin et al., 2010; Estrada and Roca-Riu, 2017; Paddeu, 2017; van Duin et al., 2018) showed that involving LSPs as users of UCCs and/or operators of UCCs can ensure the long-term viability of UCCs through providing the required volume of goods and the expertise of consolidation and other value-adding services. The current literature does provide limited evidence on the perception of LSPs on using UCCs with respect to other local transport policies. Similar interviews can be organised with LSPs to understand the characteristics of their operations, the effect of spatial distribution of their destinations of their operations, and the effect of local transport policies. Then, the research can be extended to investigate LSPs' responses towards using UCCs with respect to other local transport policies; mainly, the ones bring restrictions on travelling, loading and unloading, and parking.

The studies focusing on retailers' aspects in the context of UCC is limited. The third study in this thesis has made an attempt to fill this gap via investigating the willingness of retailers to subscribe to UCCs when local transport policies are introduced. Future studies could replicate the same study in more cities. Factors such as the relationship between stakeholders and public authorities, the impact of existing policy measures on retailers' operations, and logistics operations of stakeholders have an impact on perceptions of retailers' about changing their delivery methods. These factors can affect retailers' decision making differently because dynamics of cities vary depending on how they are governed and how retailing activities take place. Therefore, more studies from different cities and countries will contribute to the generalisability of the findings. Investigating other contexts could be useful to understand other factors that affect retailers' decision making. Also, it may be valuable to investigate different types of retailers such as small/medium size food markets, restaurant, and cafes in the future.

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APPENDIX A: UPDATES ON THE LOW EMISSION ZONES IN ENGLAND AND SCOTLAND AND UPDATES ON USING CARGO BIKES IN EDINBURGH

Clean Air Zones in Birmingham

The Clean Air Zones in Birmingham is planned to be implemented early 2020; however, it has been postponed due to the delivery of digital systems, which are required to make CAZ operational. As a result of Covid-19, the launch of the CAZs has been postponed until 2021. The zones will operate 24 hours a day, 365 days a year (Birmingham City Council, 2020).

Clean Air Zones in Greater Manchester

At the time when the interview with TfGM took place in 2016, the respondent mentioned that the Clean Air Zones were planned to be introduced in 2018. According to the latest updates by the transport authority, the Clean Air Zones will be introduced in 2022. The scheme will cover local roads across the whole of Greater Manchester. It would operate 24 hours a day, seven days a week (Clean Air Greater Manchester n.d.).

Low Emission Zones in Glasgow, Edinburgh, Aberdeen and Dundee

At the time of the interviews, Glasgow City Council were planning to introduce LEZs in 2018. As of December 31st, 2018, LEZ were only applied to local bus services. LEZs are implemented under Transport Act 2019. LEZ will be fully implemented by 31 December 2022 and it will be applicable to all vehicles. The Scottish Government's plans to implement Low Emission Zones across Glasgow, Edinburgh, Aberdeen and Dundee have been paused temporarily in response to the COVID-19 outbreak (Transport (Scotland) Act 2019, n.d.; Low Emission Zones Scotland, n.d.).

Cargo bike scheme in Edinburgh through SURFLOGH

Recently, SEStran in collaboration with Edinburgh Napier University has been involved in a project called Smart Urban Freight Logistics Hub (SURFLOGH), which is funded by the North Sea Region Programme between 2017 and 2020. The aim of

the project is to introduce innovative freight delivery solution in Edinburgh (Scotland), Borås (Sweden), Mechelen (Belgium), Drenthe (the Netherlands), and Groningen (the Netherlands). The role of SEStran and ENU is to develop business models for urban freight hubs. SEStran collaborates with ZEDIFY, a company operating cargo bikes for deliveries in urban settings, as a part of SURFLOGH (SEStran, 2020; Interreg North Sea Region n.d.)

Ι

Dear Participant,

I am a PhD student at the Transport Research Institute in Edinburgh Napier University. I am doing research about local authorities' perspectives on urban freight transport in their cities in Scotland, England and Sweden. Findings from this research will be used to produce the first chapter of my doctoral thesis.

I would like to invite you to participate in my research study. The Interview is expected to take between 45-60 minutes. I can assure you that your name will be kept confidential. Your input will help me significantly to carry out my research. If you agree, the interview questions will be sent beforehand.

Your confidentiality and anonymity will be maintained and your personal privacy and identify will be protected. The collection, storage, disclosure and use of research data by the researcher will also comply with the Edinburgh Napier University Data Protection Code of Practice.

If you have any questions, you can contact me or my supervisor via the following contact address:

- Emine Zehra Akgun, PhD Candidate: <u>e.akgun@napier.ac.uk</u>
- Dr Jason Monios, Associate Professor: j.monios@napier.ac.uk

Thank you very much for your interest,

Emine Zehra Akgün

PhD Candidate

Transport Research Institute, Edinburgh Napier University Merchiston Campus 10 Colinton Road Edinburgh EH10 5DT

INTERVIEW GUIDELINE FOR LOCAL AUTHORITIES

General

- 1. Can you describe what type of goods are distributed in your city and how goods are distributed in your city?
- 2. What are the benefits of urban freight transport for your city?
- 3. What are the disadvantages of urban freight transport for your city?

Policies

- 4. What type of documents do you have that your policies are mentioned?
- 5. What are your policy goals?
- 6. Do you have any freight focused policies that you are applying currently?
 - a. Restrictions: Low emission zone, weight/size, time windows, loading, road pricing, night distribution
 - b. Consolidation: City terminal, micro terminals, urban consolidation centres, pickup
 - c. Infrastructure and modal shift: City train, waterway, underground
 - d. Vehicle development: Fleet Recognition Scheme
- 7. If yes, for each one:
 - a. What is the policy/action?
 - b. Are they policy in the document?
 - c. Are they policy not in the document?
- 8. If not, what are the reasons?
- 9. Do you set targets and/or monitor the progress of any of these policies?
- 10. Have you considered the use of urban consolidation centres in your city?
 - a. If yes, which stage are you in?
 - b. If no, why not?

Policy Process

- 11. Do you have a dedicated personnel and/or department for urban freight issues?
 - a. If yes, what are main tasks and responsibilities of them?
 - b. If not, what are the reasons?
- 12. How do you learn about potential freight policies?
- 13. How do you choose which freight policies to implement?

- 14. What influences do the following factors have on your policy choice?
 - a. Public acceptability
 - b. Businesses/Operators
 - c. Land-use policies
 - d. Lack of resources on local level
- 15. Do you consider the effects of non-freight policies (e.g. pedestrianisation) on UFT?
- 16. Are you in a collaboration with other authorities and/or different department in your organisation to discuss and solve urban freight related problems and to implement dedicated policies?
- 17. How do you work with regional and/or national authorities when planning UFT strategies and policies?
- 18. Have you been involved in a European Union funded project, implementation of SUMPs?
 - a. If yes, how did the project(s) contribute in the implementations of policies in your city?
 - b. If no, why not?
- 19. Is your city/council involved in any accreditation and certification programme related to transportation?

APPENDIX C: INTERVIEW QUESTIONS FOR STUDY II

Dear Participant,

My name is Emine Zehra Akgün and I am a second year PhD candidate at Edinburgh Napier University. I am carrying out my research at the Transport Research Institute. I would like to invite you to participate in my research study and to help collect data for my thesis on "Using Local Transport Policies to Support Urban Consolidation Centres". The data collected for this interview is specific to the implementation of local transport policies at a local level in order to support the use of urban consolidation centres (UCC) in cities. Therefore, I am contacting the relevant stakeholders who can give their opinions and perceptions and comment on how the UCCs have developed over time and how they can be supported by other local transport policies.

The information I am looking for includes some or all the following:

- Development process of the urban consolidation centre (relevant only if you are involved in the development process),
- \Box General discussion on the use of urban consolidation centres,
- \Box The role of local transport policies in making UCCs more feasible.

Your confidentiality and anonymity will be maintained and your personal privacy and identify will be protected. The collection, storage, disclosure and use of research data by the researcher will also comply with the Edinburgh Napier University Data Protection Code of Practice. This interview will take between 45-60 minutes of your time. If you have any other comments or queries, please contact me at **e.akgun@napier.ac.uk**

Thank you in advance for your participation.

Emine Zehra Akgün

PhD Candidate

INTERVIEW GUIDELINE FOR STAKEHOLDERS OF UCC PROJECTS AND TRANSPORTATION EXPERTS

Development Process

- 1. Were you involved in the development stage of the UCC? (Beginning from the initial development stage)
 - a. If yes, continue with the second and the question number 2
 - b. If no, proceed to the next section
- 2. Can you please tell me about the whole process of developing the UCC?
 - a. What was the reason for developing it?
 - b. What was your role?
 - c. What analysis was done (costs, flows, etc.), what data was used, was it hard to get, can we get similar?
 - d. What were the challenges? (*lack of financial resources, lack of demand, difficulties in collaborating other stakeholders*)
 - e. How did you overcome these challenges (or not)?
 - f. Where did initial funding come from (e.g. regional/national/EU projects, local authorities, private sector)
 - g. Does the UCC require ongoing subsidy? Why/why not?
 - h. What is the current governance structure and is this same as when the UCC was first established?
 - i. How did you decide on and establish the governance structure: finding an owner/operator, single user or multi-user, etc.?
 - j. Can you tell me about your experience collaborating with other stakeholders in developing the UCC, and attracting users (both public and private)?
- 3. What has been the outcome of the UCC?
 - a. Are people using it (or not). Why?
 - b. Have you measured environmental benefits? If so, what are these?
 - c. Have you (or users) measured financial or operational benefits? If so, what are these?

Using the UCC Related (All stakeholders)

- 4. What type of premises does it serve? (e.g. shopping mall, downtown retailing zones)
- 5. Why do businesses in general/you use the UCC?
- 6. What benefits can be obtained by using the UCC (in general)?
- 7. What could be changed to make the UCC more attractive to use (in general)?
- 8. Are there specific factors that make UCC work better in your city (e.g. congested, small streets; access restrictions; low emission zones)?

The role of local transport policies in making UCCs more feasible (All stakeholders)

- 9. What UFT policy goals are you aware of currently in place in your city? (e.g. reduce congestion, reduce emissions)
- 10. Please find a list of measures below and answer Questions 10-14 accordingly:
 - o Time-based access restrictions
 - o Weight based restrictions
 - o Parking restrictions
 - o Access restrictions
 - o Nighttime delivery restriction
 - o Out-of-hours delivery scheme
 - o Low Emission Zone/Clean Air Zone
 - o Congestion charge
 - o Road pricing
 - o Land use planning measures/Zoning (Shared facilities such as warehousing, HGV parking and intermodal rail and waterborne freight facilities)
 - o Dedicated loading and unloading bays
 - o Delivery service plans
 - o Other
- 11. Which of the listed measures are implemented **<u>currently</u>** in this city?
- 12. Are there any measures not currently in place that you think <u>should</u> be put in place? Why or why not?

- 13. Are there any measures amongst the listed measures you think could be used <u>specifically</u> to support the UCC?
- 14. Are there any measures amongst the listed measures you would **<u>not</u>** like to be put in place? Why not?
- 15. What do you think about the approach of implementing restrictive measures but then exempting you if you use the UCC?
- 16. Why do you think UCCs have not always been successful in many cities in the past?
- 17. Should UCCs be developed by the public sector if there is no private interest?a. What would be the pros and cons?

INTERVIEW GUIDELINE FOR ACADEMIC EXPERTS IN THE AREA OF URBAN FREIGHT TRANSPORT

General Questions

- 1. What are the benefits of urban freight transport?
- 2. What are the disadvantages of urban freight transport?
- 3. What should local/regional/national authorities do for establishing more inclusive transport planning that includes UFT? (Which documents should local authorities produce?)
- 4. What influences do these factors have on your policy choice?
 - a. Public acceptability
 - b. Businesses/Operators
 - c. Land-use policies
 - d. Lack of resources on local level
 - e. Non-freight (e.g. pedestrianisation, extending cycle & walking lanes, bus only lanes)
- 5. Do you work with local/regional/national authorities concerning UFT (or particularly relating to urban consolidation centres)?
- 6. How do you collaborate? What is the basis of your collaboration? (E.g. knowhow, exchanging knowledge and experience, participating projects)

UCC specific Questions

7. What benefits can be obtained by using urban consolidation centres?

- 8. What are the challenges of urban consolidation centres (e.g. cost, complications to supply chain, lack of interest from different stakeholders)?
- 9. Why do you think urban consolidation centres have not always been successful in many cities in the past?
- 10. What could be changed to make urban consolidation centres more attractive to use?
- 11. Are there specific factors that make consolidation centres work better in cities like Gothenburg, Stockholm, London, Paris but not in Scottish cities? (e.g. congested, small streets; access restrictions; low emission zones)?
- 12. Should consolidation centres be developed by the public sector if there is no private interest?
- 13. Are you involved in setting up (or doing the feasibility studies) the CC?
 - a. If yes, go to specific questions
 - b. What was your role?
 - c. If involved in a UCC project, did you work with any public or private stakeholders?
 - d. How?
 - e. What are the challenges and benefits of working with other stakeholders in the CC project?
- 14. Please find a list of measures below and answer Questions 15-18 accordingly:
 - o Time-based access restrictions
 - o Weight based restrictions
 - o Parking restrictions
 - o Nighttime delivery restrictions
 - o Out-of-hours delivery scheme
 - o Low Emission Zone/Clean Air Zone
 - o Congestion charge
 - o Road pricing
 - o Land use planning measures/Zoning (Shared facilities such as warehousing, HGV parking and intermodal rail and waterborne freight facilities)
 - o Dedicated loading and unloading bays, Delivery service plans
- 15. Are there any measures not currently in place that you think should be put in place? Why or why not?

- 16. Are there any measures amongst the listed measures you think could be used **specifically** to support the CC?
- 17. Are there any measures amongst the listed measures you would <u>not</u> like to be put in place? Why not?
- 18. What do you think about the approach of implementing restrictive measures but then exempting you if you use the CC?
- 19. Why do you think UCCs have not always been successful in many cities in the past?
 - a. Should UCCs be developed by the public sector if there is no private interest?

INTERVIEW GUIDELINE FOR PUBLIC AUTHORITIES (LOCAL, REGIONAL, NATIONAL)

General Questions

- 1. What is your role in governing urban freight transport (UFT) related issues in your city/region/country?
- 2. What are your objectives when dealing with UFT?
- 3. What are the benefits of UFT?
- 4. What are the disadvantages of UFT?
- 5. Do you implement UFT focused policies? Or do you implement general transport policies that comprise freight vehicles?
 - a. If yes, for each one:
 - i. What is the policy/action?
 - ii. Are they policy in the document?
 - iii. Are they policy not in the document?
 - b. If not, what are the reasons?
- 6. How do you learn and choose your potential freight policies?
- 7. How do you work with other public authorities when planning UFT strategies and policies?
- 8. What type of documents do you have that your policies are mentioned?
 - a. Any particular document that related to the CC project?
- 9. What influences do the following factors have on your policy choice?
 - a. Public acceptability
 - b. Businesses/Operators
 - c. Land-use policies
 - d. Resources
 - e. Non-freight policies

UCC specific Questions

- 1. Are you involved in setting up (or doing the feasibility studies) the CC?
 - a. What was your role?
- 2. Do you provide financial or land support for the CC project?
- 3. What are your particular goals to achieve by implementing the CC solution?
- 4. What are benefits of having CC in your city/region/country?

- 5. How do you work with other public and private stakeholders involved in the CC project?
 - a. What are the challenges and benefits of working with other stakeholders in the CC project?
- 6. Do you have policies in place specifically to support the CC?
- 7. Do any of your existing (other) policies help to support the CC?
- 8. How does using the CC help you to achieve your policy goals?

APPENDIX D: INTERVIEW QUESTIONS FOR STUDY III

Dear Participant,

My name is Emine Zehra Akgün and I am a final year PhD candidate at Edinburgh Napier University. I am carrying out my research at the Transport Research Institute (TRI). I would like to invite you to participate in my research study and to help collect data for my thesis on urban freight transport. The data collected for this interview is specific to understanding the retailers' perceptions on using UCCs.

The information I am looking for includes some or all of the following:

- o How do your delivery operations at your shop takes place?
- How do you get affected by the policies implemented by the City Council such as time window restrictions or parking restriction?
- Would you considers changing the way of receiving your deliveries and would you consider using a consolidation centre? (Please see the footer for the definitions)?

Your confidentiality and anonymity will be maintained and your personal privacy and identify will be protected. The collection, storage, disclosure and use of research data by the researcher will also comply with the Data Protection Act 2018 and the Edinburgh Napier University Data Protection Code of Practice.

This interview will take between 15-20 minutes of your time. If you have any other comments or queries, please contact me at **e.akgun@napier.ac.uk**

Thank you in advance for your participation.

Emine Zehra Akgün

PhD Candidate

Transport Research Institute, Edinburgh Napier University Merchiston Campus 10 Colinton Road Edinburgh EH10 5DT

INTERVIEW GUIDELINE FOR INDIVIDUAL RETAILERS IN THE CITY OF EDINBURGH

General operational questions

- 1. How do you receive your deliveries?
 - a. How many times during the day?
 - b. What time during the day?
 - c. Who brings your deliveries?
- 2. What type of difficulties (if any) do you experience when receiving deliveries?

Urban freight transport policy measures

- 3. In your opinion, what are the pros and cons of the following policy measures?
- 4. Currently applied in Edinburgh:
 - a. Time window restrictions: Vehicle traffic is not allowed during certain periods of the day.
 - b. Loading/unloading restrictions: Loading/unloading not permitted or allowed only for a period.
 - c. Availability of loading and unloading bays: Increase in provision of bays for freight vehicles.
 - d. Allowing out-of-hours deliveries: Deliveries can also take place after regular business hours such as between 7 pm and 7 am.
 - e. Parking restrictions: Banning parking for vehicles on pavements and kerbsides on particular streets.
 - f. Increase in pedestrianised areas: Closure of an area for all vehicles temporarily during the day or permanently.
- 5. Potentially applied in future:
 - a. Low emission zones: A traffic pollution charge scheme with the aim of reducing the emissions of diesel-powered commercial vehicles.
 - b. Congestion charge: A charge made to drive into an area, typically a city centre that suffers heavy traffic.
 - c. Delivery and servicing plans: A framework for organizing efficient deliveries to certain areas and buildings time wise and space wise.
The use of urban consolidation centres (UCCs)

- 6. What benefits do you think you could obtain for your business by using a UCC?
- 7. What challenges do you think you would experience if you started using a UCC?
- 8. Imagine that there is a UCC in Edinburgh, and that the council applied certain policy measures (the same ones listed above). Which measures would make you more or less likely to use the UCC (and why)?
 - a. Time window restrictions (exempt if using the UCC)
 - b. Loading/unloading restrictions (exempt if using the UCC)
 - c. Parking restrictions (exempt if using the UCC)
 - d. Pedestrianisation (exempt if using the UCC)
 - e. Low emission zones (exempt if using the UCC)
 - f. Congestion charge (exempt if using the UCC)
 - g. Increased availability of dedicated loading and unloading bays
 - h. Out-of-hours deliveries
 - i. Delivery and servicing plans
- 9. Urban consolidation centres can provide some additional services. Would you be more likely to use the UCC if one or more of these services are offered?
 - a. Delivery by electric vehicles: Using low emission vehicles from the UCC to your shop.
 - b. Customised delivery time & date: You can choose how many deliveries you want to receive during the day and the timing of the deliveries from the UCC.
 - c. Additional stockholding: The UCC can provide storage space for your deliveries so you do not need to receive them earlier or hold extra inventory during high demand seasons such as Christmas.
 - d. Pre-retailing services: Garment processing, labelling and tagging, making products ready for display in your shop.
 - e. Waste management & recycling: Collecting recyclable items from your shop such as plastic waste, cardboard, paper waste.

- f. E-commerce services: If you sell your products online, shipments can be picked up from your shops to be delivered or shipped to your customers.
- g. Tracking & tracing the parcels: You can see what time your deliveries will arrive from the UCC.
- 10. If these services were offered by your current transport provider, would you still want to use the urban consolidation centre?
- 11. How much would you be prepared to pay to use a UCC and is there a minimum level of service you would want for that?

Communicating with the policymakers

- 12. To what extent are you involved with the authorities that implement policy measures discussed earlier?
- 13. Does this current situation work for you or do you feel anything should change?

General business questions

14. What is the size of your business? (in annual turnover)

 $\Box \pounds 0 - 49$ (Thousands)

 \Box £50 – 99 (Thousands)

 \Box £100 – 249 (Thousands)

 \Box £250 – 499 (Thousands)

 \Box £500 – 999 (Thousands)

 \Box £1000+ (Thousands)

Definitions

Urban freight transport (UFT): is the collection of activities that accomplish the last mile delivery of goods at their final destinations (e.g. shops, restaurants, hotels, schools, hospitals).

Urban consolidation centre (UCC): A logistics facility that is situated in relatively close proximity to the urban area that serves a city centre, an entire town or a specific site such as a shopping centre, airport, hospital or major construction site.