

**The benefit of integrating freight logistics into urban transport demand
management measures and policies**

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The candidate confirms that the work submitted is her own, except where work which has formed part of jointly authored publications has been included. The contribution of the candidate and other authors to this work has been explicitly indicated below. The candidate confirms that appropriate credit has been given within the thesis where reference has been made to the work of others.

Some of the work in Chapter Six forms the basis of the following jointly authored publication:

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My contribution to this paper is 45%. The planning, design and most of the analysis was done in cooperation between the two main authors (Ballantyne & Lindholm). Data collection was conducted individually by the two main authors. The data I provided was entirely from the UK (twelve of sixteen local authority interviews, and ten of the freight stakeholder interviews). All three authors contributed to the writing of the paper and amendments made in response to the reviewers comments. Lindholm contributed 45% and Whiteing 10% towards the completion of the paper.

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Abstract

The communication gap between local authorities and freight operators has long been acknowledged as a research problem. Such a gap is problematic because of a lack of data and understanding about freight movements in most local authorities, which leads to the design of sub-optimal policies for freight. Hence policies and or interventions designed to address particular problems may in fact result in unforeseen new issues with resulting negative environmental impacts. Although these problems have been well identified in academic research relatively few attempts have been made to understand them and think of new ways to approach addressing them. This thesis makes a distinctive contribution through new empirical research and the development of new methodological tools to help overcome the communication gap.

This thesis describes interviews with twenty-two urban freight stakeholders, namely local authority and freight operator representatives. In addition, it draws on decision analysis theory and techniques, and utilises elements of the Nominal Group Technique, Positional Analysis and focus groups to create an interactive, facilitated workshop method to foster improved freight stakeholder engagement. Three facilitated workshops were held in different locations around England to understand the effectiveness of this method.

The interviews and initial stages of the workshop show a divergence of opinion between the two groups of stakeholders on what the most effective and desirable policy solutions are. However, the workshop format also provided a means to debate differences, identify solutions that had support across the board, and to put new solutions on the table for one or other group. The evaluation exercises from the workshop showed support for this type of method as a means of engagement as it provided a focus around potential implementation. Comparison with existing means of engagement such as Freight Quality Partnerships suggests this to be a more dynamic and purposeful form of engagement, at least in the short term. In addition, since these solutions are the result of joint participation between local authority and private sector freight stakeholders it would seem that they would be likely to receive fewer objections if carried forward to the consultation stage of policy implementation.

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Abbreviations and Acronyms

AQMA	Air Quality Management Area
CBD	Central Business District
CILT	Chartered Institute of Logistics and Transport
CPZ	Controlled Parking Zone
DETR	Department of the Environment, Transport and the Regions
DFT	Department for Transport
DVLA	Driver Vehicle Licensing Agency
EC	European Commission
EU	European Union
FORS	Freight Operator Recognition Scheme
FQP	Freight Quality Partnership
FTA	Freight Transport Association
GDP	Gross Domestic Product
HGV	Heavy Goods Vehicle
IHT	Institution of Highways & Transportation
ITS	Intelligent Transport System
JIT	Just in Time
LA	Local Authority
LCC	London Congestion Charge
LEZ	Low Emission Zone
LGV	Light Goods Vehicle
LMZ	Lorry Management Zone
LTA	Local Transport Authority
LTP	Local Transport Plan

NGT	Nominal Group Technique
OECD	Organisation for Economic Co-Operation and Development
PCN	Penalty Charge Notice
POD	Proof of Delivery
RHA	Road Haulage Association
Sat Nav	Satellite Navigation
TDM	Transport Demand Management
TfL/TFL	Transport for London
TRO	Traffic Regulation Order
UCC	Urban Consolidation Centre
UK	United Kingdom
VAT	Value Added Tax
VED	Vehicle Excise Duty
WTD	Working Time Directive

1 Chapter One – Introduction

1.1 Introduction

The aim of this thesis is to investigate the benefits of and barriers to integrating freight logistics more closely into urban transport demand management measures and policies. The movement of goods is central to the effective functioning of cities, and the movement of people is fundamental to livable and thriving cities. Whilst synergistic policies are possible there are also inherent conflicts between the developing supportive conditions for freight and passenger transport. This thesis examines the issues of coordination and collaboration between local government and freight operators to provide new insights into the process of policy making and how any gap which may exist can be closed or reduced to mutual benefit.

This chapter introduces the importance of the problem space set out above and locates the study within some of the key debates. It serves as a signpost for the thesis, introducing the structure of the thesis and the research objectives that are developed in more detail in Chapters Two to Five.

1.2 Background and context

Freight transport has a fundamental role in maintaining modern urban civilisations. Without it, the movement of essential goods both into and out of urban areas (mass populated locations) would not be possible. In 1992, Ogden proposed that the consideration of freight in urban policy, planning and design could result in significant benefits for the wider community. Therefore, it is very important that the generation of urban transport policies and any urban planning considers the needs of freight transport.

Urban freight however, is a very diverse area of transport where common traits can be very difficult to identify. For instance, the types of vehicles used to transport urban freight range from small vans (LGV's) to full scale heavy goods vehicles (HGV's). Similarly, the range of commodities being transported into, within and through urban areas is also vast, from building materials and equipment to groceries and small parcels. Urban points of delivery and collection for the variety of urban freight are also wide ranging, from commercial properties such as warehouses and retail premises to construction sites and residential properties. Ogden (1992, p4) explains that the complexity and heterogeneity of urban freight “means that there are a multitude of ‘actors’ in the urban freight scene, and therefore a multitude of perceptions of ‘the problem’.”

Road transport is the dominant mode for goods movements in urban areas due to the limited availability of viable alternatives. However, this can contribute to various problems such as traffic congestion and negative environmental impacts, for which there are no standard or easily applicable solutions (Stanchev and Whiteing, 2006; Konstantinopoulou, 2010; Allen et al, 2010). Furthermore, the impacts of transport demand management (TDM) measures and policies often used by local authorities to help minimise the effects of these problems can, unless designed well, hinder the efficiency and effectiveness of urban freight operations.

The differing perceptions and attitudes towards the problems associated with urban freight often create tensions between the various actors and stakeholders involved. As such, policy makers and planners, particularly at the local level are challenged with implementing urban transport policy that attempts to satisfy the conflicting goals of different stakeholders. However, there appears to be a general lack of engagement between local authorities and private sector freight stakeholders, and as such there is potentially significant benefit from involving more freight stakeholders in urban freight transport planning decisions.

Planning for freight is different to planning for transport in general. It happens over different spatial scales, and has different routines and time constraints to passenger transport (Slack, 2013). Different skills will therefore be needed to design solutions that work for freight. Since freight operators are not formally consulted on transport policy developments and, since freight unlike passengers does not have a vote, there is a different importance given to freight in policy making (Ogden, 1984). This leads to the question of how well do we satisfy conflicts between freight and non-freight transport, and what could be done to improve that. Research suggests that there is a lack of engagement between policy makers and private sector freight stakeholders (Ogden, 1992; Browne et al, 2007; Quak, 2008; Lindholm and Browne, 2013). Despite this, in the 20 years since these issues were clearly set out there has been little research that has enabled a change in the engagement practices and design of policies to overcome these issues. This thesis explores these tensions and the contention that engagement and understanding is a major part of the policy implementation problem, filling a major research need.

1.3 Thesis outline

1.3.1 Chapter Two- Transport Demand Management in the context of urban freight

This chapter draws on European and US literature to introduce the objectives of transport policy and their application to urban transport more specifically. These

objectives are then explained within the context of the UK policy environment, together with an overview of the government mechanisms for introducing transport policy at varying levels. The latter part of this chapter introduces the potential for conflicts (and synergies) through the discussion of a selection of Transport Demand Management (TDM) measures and policies that are often implemented in urban areas by local authorities. These illustrate that whilst these solutions may have wide ranging benefits for the transport system as a whole, they can often negatively impact on freight transport operations, thus highlighting the conflicts between freight transport and other road users. This contributes to the establishment of the first, second and third research aims and their subsequent objectives.

Aim one is to examine local authorities' understanding of urban freight flows and the consideration given to freight in urban transport policy decision making.

- Determine local authorities' perceptions of urban freight and their ability to manage it.
- Establish current sources of data on urban freight.
- Understand the actors involved in discussing freight transport policies.
- Verify the level of engagement that local authority transport planners and policy makers have with private sector stakeholders.

Summary hypothesis: Currently local authorities have insufficient knowledge or expertise to plan effectively for urban freight.

The second research aim is to perform an analysis of current urban Transport Demand Management (TDM) measures and policies, to establish which cause the greatest conflicts between the goals of policy makers and logistics operators.

- Identify the most commonly applied TDM measures and policies, with reference to urban freight.
- Understand what impacts the TDM measures and policies are aimed at alleviating.
- Determine which TDM measures and policies inconvenience logistics operators the greatest.

Summary hypothesis: The majority of TDM measures and policies are implemented to achieve overarching goals to which freight traffic contributes. However, the impact of these measures on urban freight operations is not well understood.

The third aim is to create awareness amongst local authorities of the implications that their urban policy decision making has on essential freight movements and operations.

- Identify the negative implications of urban transport policies on freight operations.
- Understand the impact of local authority policy interventions on urban freight.
- Establish the requirements of logistics operators in urban environments that would enable them to operate more efficiently.

Summary hypothesis: Local authorities' are relatively unaware of the significant negative impacts current urban transport policies have on freight.

1.3.2 Chapter Three – The current state of urban freight

Chapter three begins by outlining the relative importance of urban freight and its role in maintaining economic growth and supporting the rising population that reside in urban areas. This is followed by a discussion explaining how road transport is the dominant mode for urban freight, but also how it contributes to urban traffic congestion and environmental issues such as pollution and green house gas emissions, that local authorities attempt to solve with TDM measures and policies. The chapter also explores the complexity associated with identifying relevant urban freight stakeholders and the difficulties of involving them in freight policy planning. Furthermore, despite the growth of interest in urban freight amongst policy makers over the last decade, and the establishment of various forms of freight partnerships between local government and the private sector freight industry (often represented by trade associations), there remain many unresolved problems and issues. The chapter concludes with an overview of several potentially innovative solutions to addressing the negative impacts associated with urban freight activities, however many of these have yet to find widespread adoption. Therefore the problem lies with how to actually get these innovative solutions, whose success is often built on cooperation between local authorities and private sector operators, to be considered elsewhere. This highlights the need to involve the private sector in the decision making process. This has led to the formation of an additional research aim; to create and test a process that enables freight stakeholders to be included in the initial creation and design of future urban TDM measures and policies so that they fully identify and incorporate the needs of urban logistics.

The fourth research aim is supported by the following research objectives:

- Facilitate collaboration between local authority and private sector stakeholders to address urban freight problems and issues.
- To understand how engagement between policy makers, freight operators and other urban stakeholders can contribute to the creation of better informed, more effective urban transport policies in the future.

Summary hypothesis: Currently private sector stakeholders have very little input into the design of urban TDM measures and policies, and there lacks a process to guide effective engagement between public and private sector groups of stakeholders.

1.3.3 Chapter Four – Review of decision making frameworks

With Chapter Three identifying the need for greater collaborative working, this chapter examines the role of decision analysis in structuring a problem and assessing the possible impacts of potential alternative solutions on different stakeholder groups. Following a brief introduction to decision analysis and its role on group decision making; five conceptual decision making models for use in transport policy and planning are reviewed. Thus examining existing decision making practices and their suitability for their inclusion in a process that enables freight stakeholders to be included in the creation and design of future transport policies. In order to address the fourth research aim, the second half of this chapter reviews a small selection of approaches that can be used by decision makers to aid their assessment and selection of options to meet pre-defined objectives and inform policy decision making. The purpose of this review is to determine the overall usefulness of these approaches for potential adaptation and incorporation into freight stakeholder workshops.

1.3.4 Chapter Five – Research Methodology

This chapter provides the rationale for the research methods and approach adopted in this research study. Firstly it explains the research philosophy in the context of logistics research, which to date is dominated by quantitative survey research that is conducted in the positivist paradigm. This research however has adopted a qualitative approach that involves a more interpretive and subjective view of the data collected. Therefore, questionnaires and semi-structured interviews are used to collect data in stage one of the research, and are used to answer the research objectives outlined under aims one, two and three. The chapter explains how two versions of the pre-interview questionnaire and interview questions were prepared to gather data from different types of stakeholders, along with the strategies adopted for recruiting participants. The second half of this chapter draws on the literature review in Chapter Four and additional research methods literature to explain how group work techniques, in

particular the Nominal Group Technique (NGT) have been incorporated into the design of a novel method for encouraging collaboration and engagement amongst freight stakeholders. The format of the inter-active facilitated group workshops that were designed for use in the second stage of the research to address the fourth research aim and its objectives is discussed in detail, including the recruitment of participants. Before drawing to a close, the potential ethical issues that could affect the research are considered towards the end of the chapter.

1.3.5 Chapter Six – Discussion on interview findings

In this chapter detailed exploration of the contention that there are conflicts between local authorities and freight is provided. First, an overview of the participants from two main stakeholder groups (local authorities and freight operators) that were involved in the twenty-two semi-structured interviews that comprise the first stage of the research; and a summary of the findings from the pre-interview questionnaires completed by each interview participant. This is followed by a detailed discussion on each of the key themes identified from the interviews. These themes included: local authorities understanding of urban freight flows and recognition of freight transport in urban areas; the relationship between local authorities and urban freight stakeholders; the main problems associated with urban freight operations; local authority initiatives developed to assist freight operators; potential challenges for urban freight transport in the future; and finally reactions to potential future solutions and scenarios including the introduction of Urban Consolidation Centre's (UCC's), urban congestion charging, and lane share schemes (reallocation of existing road space). The findings from these interviews help to answer the objectives set out in the first, second and third research aims. The chapter concludes by highlighting the need for more innovative stakeholder engagement and the design of a method to facilitate it; thus setting the stage for the workshops that address the fourth research aim in the second stage of the research.

1.3.6 Chapter Seven – Outcomes from the freight workshops

This chapter describes the findings from three inter-active facilitated freight stakeholder workshops that encouraged the use of joint participation to find ways of amending urban transport policy to improve freight operations in urban areas, whilst alleviating current urban traffic problems. The purpose of the workshops discussed in this chapter was twofold. Firstly they were used to answer the fourth research aim, to test the viability of the method for engaging freight stakeholders in the creation of solutions to urban freight problems. Secondly, they were used to identify potential solutions and ideas to urban freight problems through a collaborative and inter-active environment, thus demonstrating the similarities between the types of ideas generated as a result of joint stakeholder participation. Each workshop is addressed in turn, with a discussion

of the ideas generated by both stakeholder groups; and the results from a ranking exercise used to determine anticipated levels of effectiveness and acceptability for the implementation of each of the options discussed. In addition, the benefits associated with the top rated options in terms of effectiveness are also presented. Comparison of the options generated at each of the three workshops shows that the most popular recurring ideas include: introducing UCC's; finding more ways for local authorities to engage with the freight industry; the use of intelligent Transport Systems (ITS) and Satellite Navigation to provide real-time information to truck drivers; and facilitating out of hours and off-peak deliveries. However, the comparison of the top four most effective options across all three workshops found that only the theme of engagement between local authorities and freight stakeholders achieved comparable high levels of expected effectiveness. The chapter concludes by evaluating the overall effectiveness of the process as a method for engaging freight stakeholders from both the private and public sectors in collaborative decision making. In addition, participant feedback is used to identify potential areas for minor modifications to further enhance the effectiveness of the process.

1.3.7 Chapter Eight – Conclusions

The final chapter reflects on all four research aims and provides the overall conclusions on the research conducted. It draws on the key findings from the interviews in stage one and the facilitated workshops in stage two. Additionally, the chapter highlights the main limitations of the research, and concludes with some recommendations for further research to develop the workshop method.

2 Chapter Two - Transport Demand Management in the context of urban freight

2.1 Introduction

Without freight transport, the movement of essential goods both into and out of urban areas (mass populated locations) would not be possible. Hence, it is very important that the generation of urban transport policies and any urban planning considers the needs of freight transport. Ogden (1992, p3) proposed that “there are likely to be benefits to the community at large if explicit consideration of freight is included within urban policy, planning and design.” This chapter introduces the objectives of urban transport policy, with a particular focus on the UK, and explains how Transport Demand Management (TDM) measures are often introduced at a local level to manage freight in the urban area. Illustrative examples of popular measures introduced by local authorities are used to demonstrate the potential impacts such measures have on urban freight operations.

2.2 General Transport Policy

Slack and Notteboom (2006, p228) define transport policy as “the development of a set of constructs and propositions that are established to achieve particular objectives relating to socio-economic development, and the functioning and performance of the transport system.” As one of twenty seven member countries in the European Union (EU), transport policy in the UK is influenced by the objectives for transport set out by the EU. The latest EU transport white paper – ‘Roadmap to a single European Transport Area’ published in 2011 sets out a number of transport initiatives for the next decade. These initiatives aim to increase mobility across the European market by removing major barriers to transport operations; encouraging economic growth and employment; reduce Europe’s dependence on fossil fuels and cut carbon emissions from transport by 60% by 2050. These EU objectives for transport are reflected at a national level in the DFT (2011b) white paper ‘Making sustainable local transport happen’, which aims to create growth in the UK economy and address climate change issues by cutting carbon emissions. The focus is on addressing these issues on a local level with the objective of delivering results on a national scale. In practice, the UK government intends to achieve this through relinquishing power to local authorities in a number of key areas, including: economic power, simplifying transport funding, decentralizing planning, and improving transparency and local accountability (DFT, 2011b).

At a local level, national transport policies are administered through the Local Transport Plan (LTP) process. The LTP’s were first introduced in the year 2000 for all areas in

England, with the exception of London (DETR, 1998) to replace the previous system 'Transport Policies and Programmes', which had been operating since 1973 (Shepherd et al, 2006). The new LTP system was designed to get local authorities to plan five year transport strategies to accompany their bids for capital resource funds from the national government. To date, there have been three rounds of LTP's, the first covered 2001-2006, the second from 2006-2011, and the third came into effect from 2011.

2.2.1 Urban transport policy and the inclusion of freight

Urban transport policy aims to meet the needs of all users of the urban transport network, both private and commercial. According to the European Commission (2001), the main objectives for urban transport policy are minimizing traffic whilst maintaining accessibility to enable the support of economic and social goals. In the UK however, freight policy introduced by central government is generally concerned with reducing nationwide carbon dioxide emissions from goods vehicles (DFT, 2011b). The government aims to achieve this by encouraging goods transport to shift from road to rail and water, for which urban freight encompasses only a small portion. To enable goods vehicles to complete their distribution activities in an efficient and effective manner, the freight industry requires urban transport policy makers to consider their needs and develop policies which are acceptable to all users of the urban road network.

As May (1997) explains, the objectives of transport policy fall into a number of categories including: Economic efficiency; environmental; safety; accessibility; sustainability; economic regeneration; equity; finance; and practicability. All of these objectives can also be applied more specifically to urban transport policy. Therefore, urban transport policy encourages the implementation of a range of measures that are appropriate for tackling urban transport problems such as congested networks; pollution and emissions levels which are harmful to health; and accident prevention.

As alluded to earlier, transport is a complex multi-level policy sector (Marsden and Rye, 2010) and as such the consideration of freight transport in the UK occurs at a number of governing levels. For instance, policies can be developed on a European scale, an example being the creation of a single European marketplace (European Commission, 2010) to assist with the harmonization of the movement of goods over the European Economic Area (EEA); through national (e.g. rail freight tariffs) to local policies such as night time freight bans. The different roles that each jurisdiction plays and their relative influence on freight policy are shown in Table 2-1.

LEVEL OF GOVERNANCE	FREIGHT POWERS
European Union	Imposes best practice and transport related targets (e.g. relating to environmental performance). Also introduced the Working Time Directive that directly affects drivers of the freight vehicles.
National Government	Introduction of national policy that affects all freight operators in the UK, for example the UK government plans to introduce lorry road user charging by April 2014 (Department for Transport, 2012).
Local Authority	Development and implementation of policies, bylaws, traffic regulations and freight partnerships (IHT, 2005).

Table 2-1 Amount of freight policy influence at different governing levels

In the 2011 transport white paper the government outlines its intention to devolve responsibility for local transport to local authorities, since it believes that objectives for sustainable transport can most likely be met if approached at a local level (DFT, 2011b). This therefore highlights the importance of the LTP process, for which the DFT has produced a guidance document (for each LTP period) intended to assist local authorities to plan strategically for transport that best meets the needs of their area. These guidelines outline the duty of local transport authorities to consult different stakeholders and user groups during the formulation of policies and plans, however aside from freight train operating companies, the list of stakeholders included in the guidance document does not include any freight related organisations (DFT, 2009a). This indicates that the inclusion of freight in transport policy and strategy formulation in the UK has varied little from the 1980's when Ogden (1984, p264) described how "governments have involved themselves to varying degrees with different aspects of freight; some (such as rail) are traditionally controlled quite closely, while others (in particular, urban freight) have usually been relatively neglected."

Despite the relatively few mentions of freight in the third LTP guidance document, it does suggest that local authorities should respect the needs of both people and freight in their local policies and delivery plans; and that the impact of local targets on freight

movements also be considered (DFT, 2009a). In addition, the guidance recognises that in order to realise the goal of supporting economic growth, it is necessary to improve and maintain journey time reliability on key local routes for freight (ibid). However, as previously mentioned, the third LTP does not require authorities to formally consult the freight industry on proposed transport strategies and policy amendments; the only means of formal engagement is typically through 'Freight Quality Partnerships' (FQP's), which bring together industry, local government and representatives from local and environmental interest groups. The FQP's were launched in 1996 by the Freight Transport Association (FTA) and have been promoted by the government since 1999 (Allen et al. 2010). Their main aims were: "to identify problems perceived by each interest group relating to the movement and delivery of goods in their city; to identify measures within the group's competence to resolve or alleviate such problems; to identify best practice measures and principles for action by local government and industry to promote environmentally sensitive, economic and efficient delivery of goods in towns and cities" (Allen et al. 2010, p1). Since freight movements are rarely confined to single localities, the third LTP guidance suggests that local authorities explore the possibility of extending existing locally led initiatives such as FQP's across regional boundaries (DFT, 2009a).

2.3 Urban Freight Transport Policy

In 1977, Hicks (p101) defined urban freight transport as "all the journeys into, out of, and within a designated urban area by road vehicles specifically engaged in pick-up or delivery of goods (whether the vehicle be empty or not), with the exception of shopping trips." It is also suggested that professional logistics operators completing home deliveries should be included in urban freight movements (Dablanc, 2008). Examples of the types of freight delivered to urban areas include: stock to retail shops; catering supplies to restaurants, bars and public houses; supplies to schools, hospitals and public buildings; street cleaning services (refuse collection etc.); materials to construction sites; shipments of office supplies; courier and parcel services; home deliveries from internet shopping, and general domestic and household deliveries (IHT, 2005).

Taniguchi (2003) describes how urban freight fits into the supply chain as a whole, and the important relationship of urban freight with inter-urban freight transport, which policy makers need to understand when making urban freight transport policies. Taniguchi (2003) explains that "the location of logistics terminals connecting inter-urban and urban freight transport plays an important role for creating safe and efficient transport systems." For example, urban congestion is increased when trucks have greater

distances to travel between the logistics terminal (e.g. an urban consolidation centre) to the final delivery point in a city centre (Taniguchi, 2003).

Taniguchi (2003) uses the case of small truck efficiency in urban areas of Japan to illustrate the need for transport planners and policy makers to have a comprehensive understanding of the logistics and freight transport systems. Research by the Japanese Ministry of Land, Infrastructure and Transport showed a continual decrease in small truck efficiency throughout the period 1970 to 1997. Taniguchi (2003) explains that increased demands in modern supply chains for the frequent delivery of small loads have reduced the efficiency of small trucks used to transport them. This is one of the negative effects of the late 20th Century concept of Lean and Just-in-Time (JIT) practices. The trend towards Lean and JIT practices has been widely adopted in today's retail supply chains, especially by those retailers operating in urban areas and particularly the Central Business District (CBD) where space is at a premium, leading to retailers reducing their capacity to store goods, therefore requiring more frequent deliveries to replenish stock (Taniguchi, 2003). The Lean and JIT trend has caused an increase in the number of part-loaded freight vehicles on the roads, which is an inefficient use of vehicle capacity. These greater numbers of vehicles operating contribute to higher levels of congestion and rising transport costs.

2.3.1 Motivations for urban freight transport policy

Ogden (1992) divides the issues that influence urban freight transport policies into three categories, which are economic development; transport efficiency; and minimisation of adverse impacts. Research indicates the importance of urban freight in relation to economic development, highlighting a significant contribution made to Gross Domestic Product (GDP). In 1982, Hall estimated around 10% of GDP was attributable to freight movements, rising to 17% if inventory and warehousing is included (Ogden, 1992). Recent DFT (2012a) statistics indicate a broad correlation between GDP and goods moved by road in Britain, as shown in Figure 2-1, reflecting the demand for goods and services.

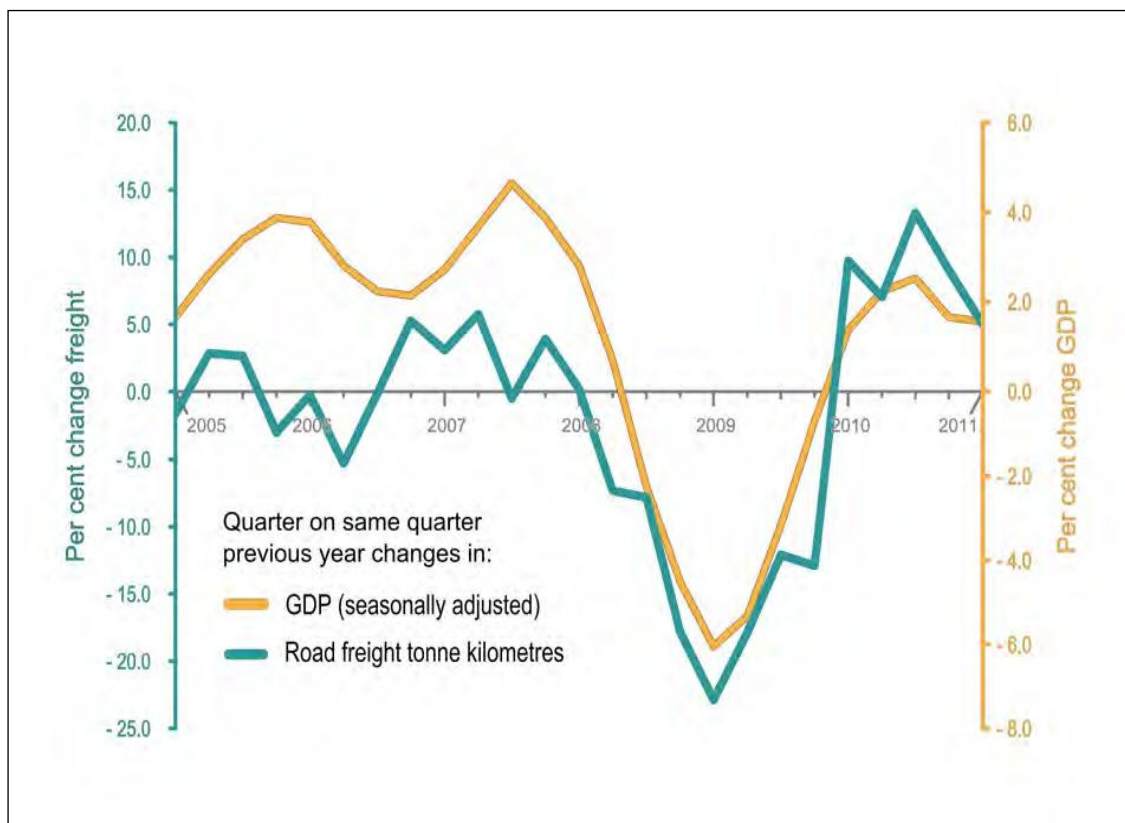


Figure 2-1 Quarter-on-quarter changes in GDP and goods moved by British HGVs, 2005–2011 (DFT, 2012a, p2)

There are a variety of factors responsible for driving the implementation of urban freight transport policies, which are derived from the negative impacts of urban freight traffic. A study of urban freight strategies in seven European cities revealed traffic congestion; noise and air pollution; intrusion and road safety to be the most significant impacts driving urban freight policies (Lewis, 1997). On the UK road network, traffic congestion has generally increased year on year until recently when statistics for 2007 to 2010 showed a drop in motor traffic for the first time since 1949 when records began (DFT, 2013a). However, despite this overall decline, HGV traffic has increased slightly by 0.3% between 2009 and 2010, and more significantly LGV traffic increased by 0.9% in this time and 28.6% rise during the period 2000-2010 (ibid). With regards to the general increase in traffic congestion, McKinnon et al. (2009, p344) highlight that “approximately a quarter of road freight journeys are subject to a delay and that traffic congestion accounts for roughly a third of these delays”. Congestion related delays tend to be shorter than delays due to other causes such as delayed starts to journeys resulting in congestion being responsible for some 23% of the total delay time in road freight transport (Ibid).

Additional factors driving urban freight policies including poor accessibility, environmental issues such as pollution and the use of finite natural resources; and economical reasons also contribute to urban freight policy objectives (Visser et al,

1999). Although, for logistics operators, urban freight transport is primarily concerned with achieving efficient and effective distribution of goods to customers at the end of the supply chain (Stanchev and Whiteing, 2006), and operators are therefore most interested in policy objectives that are supportive towards the realisation of this goal.

There are various causes of inefficiency in urban freight transport, from levels of traffic or layout of a road network to more general urban transport policies such as introduction of bus lanes, which have unintended consequences for freight transport operations. Inconsistencies between urban freight transport policy measures in neighbouring urban areas or in different locations within a single urban area, such as different time window access restrictions or vehicle emission regulations, may complicate multi-drop deliveries carried out with one vehicle (Allen and Browne, 2010). In urban areas, the public sector is responsible for freight transport regulations, incorporating infrastructure to accommodate commercial haulage vehicles, the provision of either off-street loading areas or allowing for on-street loading areas, and measures which aim to improve fuel efficiency such as linked traffic signals to cut down polluting stop/start traffic movements. Therefore local authority planners and policy makers need to consider the needs of freight vehicles in order to balance regulations so as to avoid inefficient transport operations (Ogden, 1992; Allen and Browne, 2010).

2.3.2 Key objectives for urban freight policy

The overall goal of urban freight policies according to Hicks (1977, p.p. 102-103) is “the discovery and effective implementation of measures which will reduce the total social cost of goods movement to the lowest possible level commensurate with the freight requirements and objectives of society.” Ogden (1992) translated these social costs into six key policy objectives (Visser et al., 1999):

- 1) Economic objectives
- 2) Operational Efficiency objectives
- 3) Road Safety objectives
- 4) Environmental impact objectives
- 5) Infrastructure objectives
- 6) Urban form objectives

Whilst on the surface these objectives are consistent with general urban transport problems and objectives, the solutions for freight may be different and freight may be seen to be part of the wider problem. It is also worth noting that solutions which may be optimal for a company could be sub-optimal for a city.

1) Economic objectives

By creating policies that work towards improving and developing the urban freight system, a positive contribution to the economy of the region or nation can be made. Urban freight transport in general contributes to economies as a substantial employer and helps businesses to maintain their commercial competitiveness (Ogden, 1992). Visser et al. (1999) adds that economic and efficiency objectives of urban freight transport policy are inter-dependent, since improving operational efficiency serves economic objectives such as creating new business opportunities.

2) Operational Efficiency objectives

These range from reducing transport operating costs to improving transport service quality. For example reducing operating costs may include: fuel expenses, cost of storage, drivers' wage costs, and permit costs etc. The level of freight security during transit; reliability and accuracy of delivery; and access are just some of the areas where improvements in transport service quality can be made (Ogden, 1992, Visser et al., 1999).

Visser (2006) explains that operational inefficiency can occur at different operational levels, for example the volume of goods transported is always greater than the volume consumed or purchased, since additional packaging material is used to transport products. Alternatively, inefficiency could occur as a consequence of inadequate load consolidation that results in an inflated number of vehicle kilometers accumulated compared to transport performance; or the use of oversized vehicles relative to the load being carried (ibid). Furthermore, the introduction of weight limits is also likely to increase the number of vehicles operating in the urban area since there is little opportunity to consolidate loads (Whiteing, 1999). The use of time access windows in urban areas can also lead to similar operational inefficiencies for transport operators. For instance, by allocating a set time for goods vehicles to enter an urban area, operators are under increased pressure to complete multiple deliveries within a set time-frame and may be required to use a greater number of vehicles than is necessarily required (Quak and de Koster, 2006).

3) Road Safety objectives

There is a high demand from a multitude of stakeholders for urban transport policy to influence the provision of safer roads. DFT (2010a) statistics show that in Great Britain in 2009 only 2.5% (2640 accidents) of all reported road accidents in urban areas involved HGV's, and 7% (7369 accidents) involved LGV's compared to approximately

88% (92,213 accidents) that involved cars. Nevertheless, policies aimed at reducing the involvement of goods vehicles in road traffic accidents may include traffic management, land use planning and operational practices (Ogden, 1992). It is also worth highlighting that a high policy profile has been generated by the high proportion of pedal cyclists killed and seriously injured in London, and according to TfL (2011) goods vehicles were the second most common vehicle to be involved in collisions with pedal cyclists after cars. In 2010 goods vehicles were involved in 13% of collisions resulting in a serious injury to a pedal cyclist (TfL, 2011). Furthermore, HGV's were involved in two fatal collisions (20%) with pedal cyclists, and two further cyclist fatalities (20%) were a result of collisions with a concrete mixing lorry and a skip wagon (since these are recorded as 'other motor vehicles' rather than goods vehicles they were excluded from the HGV total) (Ibid).

The impact of urban road accidents can result in four types of cost: delays; injuries and fatalities, as well as damage to infrastructure and property; increased vehicle operating costs as a result of congestion caused by accidents and incidents; and clean-up costs to return a road to a serviceable condition (Ogden, 1992).

4) Environmental Impact objectives

Freight transport has become an issue for policy makers concerned with global pollution and the consumption of finite natural resources (Visser et al. 1999), as such planning for urban freight needs to respond to growing environmental and sustainability concerns (Zanni and Bristow, 2010) In the UK, road transport accounted for just over 90% of all domestic transport greenhouse gas emissions in 2009, with car traffic responsible for 58%, and heavy goods vehicles and light van traffic accounting for 30% (DFT, 2011a). With road transport emissions being a major source of greenhouse gas emissions there is a need for air pollutants to be monitored and controlled so as to reduce risks to human health and wellbeing, and the natural environment. Although the DFT (2011a) statistics report a significant drop in air pollutant emissions between 1990 and 2009, largely due to cleaner road vehicles and fuels; the emissions at city and urban level remain important externalities that continue to cause "premature mortality, disability, aggravation of respiratory and cardiovascular disease, and sleep disturbance" (Browne et al., 2012, p19). As the number of people living and working in urban areas continues to increase so does the demand for urban freight transport, and hence policy makers are required to introduce measures to reduce the negative impacts of urban freight operations (Ibid).

Therefore, according to Visser et al. (1999) and Ogden (1992) the following policy objectives relate to the impact of urban freight on the environment: reducing levels of

local air pollution; reduced noise pollution; reduced vehicle emissions; and generally slowing down the consumption rate of finite resources and the use of fossil fuels. For example, to reduce local air pollution and vehicle emissions in London, a low emission zone (LEZ) was introduced in 2008 that covers most of the road network in Greater London. The LEZ is in permanent operation and uses an automatic number plate recognition camera system to check that vehicles travelling within the zone (with the exception of cars and motorbikes) meet the emissions standards, otherwise a daily charge is payable (TFL, 2012a). Euro standards (determined by the European Union) refer to the amount of pollution emitted by a vehicle's exhaust, which is set at Euro IV for lorries and buses, and Euro III for larger vans, minibuses and other specialist diesel vehicles (Ibid). The London LEZ was designed to ensure that goods vehicles operating in the city meet these specified emissions standards, thereby working to reduce the frequency of air quality targets being exceeded and improve overall emissions levels (Browne, et al. 2005; Allen and Browne, 2010). The London LEZ scheme is reviewed in section 2.4.4 as part of a discussion on environmental policies that impact urban freight.

5) Infrastructure objectives

The provisions required by urban road freight include bridge clearances; lane width; and pavement depth. In terms of urban road freight, infrastructure objectives are aimed at reducing total expenditure on road construction and maintenance, which increases with the need to provide for the passage of freight vehicles. With a significant amount of resources attributed to infrastructure, of which HGV's are responsible for a large share of the costs, governments attempt to use measures such as road user charging to recover some of these costs (Ogden, 1992). In the UK, with the exception of one motorway link (the M6 toll) and a few tolled bridges (e.g. the Humber Bridge) and tunnels (e.g. Tyne Tunnel), there are no direct charges for using road infrastructure (Allen et al., 2008). Therefore, Vehicle Excise Duty (VED) is used by the national government to collect the majority of these costs, which is paid nationally per vehicle per annum. The amount of VED charged depends on the size of the vehicle and levels of emissions. However, HGV's are classified into one of seven VED bands, determined by the number of axles on the vehicle and the gross vehicle weight. For rigid vehicles, these rules are more straightforward, whereas for articulated lorries the number of axles on the trailer can affect which VED 'tax' band the vehicle is classified under; and if an HGV has a reduced pollution certificate it will pay a lower rate of VED (DVLA, 2013). Since a large proportion of infrastructure spending can be attributed to HGV's, the VED has traditionally been high for this category of vehicle. Table 2-2 shows the current VED rates charged to HGV's. For instance, in a study of road freight vehicles

operating in London, Allen et al. (2008) estimated that in 2006 approximately £11.6million was paid in VED by HGV's operating in London, and a further £31.2million in VED was paid by LGV's. This was calculated according to road freight vehicles with keepers' addresses in London (Ibid).

Key Table to Heavy Goods Vehicle (HGV) tax bands for rigid and articulated vehicles				
HGV tax band	Standard (Tax Class 01)		Reduced pollution (Tax Class 45)	
	12 months	Six months	12 months	Six months
A	£165	£90.75	£160	£88
B	£200	£110	£160	£88
C	£450	£247.50	£210	£115.50
D	£650	£357.50	£280	£154
E	£1,200	£660	£700	£385
F	£1,500	£825	£1,000	£550
G	£1,850	£1,017.50	£1,350	£742.50

Table 2-2 Rates of HGV VED valid from 1 April 2013 (DVLA, 2013, p2)

According to a report by the Metropolitan Transport Research Unit (2006) the key source of local authority expenditure on highway maintenance is surface repairs to the carriageway, which are almost completely attributable to heavy goods vehicles. The report explains that the damage caused by heavy vehicles increases with approximately the fourth power of the axle load, for instance "one axle of 10 tonnes (HGV scale) is 160,000 times more damaging to a road surface than an axle of 0.5 tonnes (car scale)" (Ibid, p3), although this is dependent on the relative strength or weakness of the road surface.

6) Urban Form objectives

Rodrigue et al. (2006) define urban form as "the spatial imprint of an urban transport system as well as the adjacent physical infrastructures", and therefore spatial urban structure is a result of "the set of relationships arising out of the urban form and its underlying interactions of people, freight and information." (Rodrigue et al., 2006) Consequently, urban transport (public, individual or freight) naturally has considerable influence over urban form, and often cities have developed and established their form in relation to transport.

According to Ogden (1992, p132) there are three aspects of urban form relating to freight transport that can influence urban development: "the interaction between freight and urban structure, city size and its effects on freight costs, and freight as a user of urban land." The resultant effect of poor location decisions and sub-optimal transport networks can lead to urban problems such as congestion, and increased transport costs. Facilities for freight transport should therefore be taken into consideration during

the planning stages of urban development (Ogden, 1992). Hesse (2004, p1050) remarks that “policy and planning activities should concentrate on particular spatial ‘contexts’ of urban and regional freight transport.” Hesse (2004) compared urban centre logistics with regional logistics facilities on the urban fringe, unlike urban centres where logistics needs to adapt to the existing built environment, space at new logistics nodes has been adapted to meet the needs of logistics and distribution from the outset.

2.3.3 The impact of traffic congestion on urban freight transport policy

Ogden (1992) believes that because traffic congestion affects all actors within the community and incurs a cost to all road users, it is an issue for policy and planning to address. Traffic congestion occurs when the demand for road space approaches and exceeds the available capacity; resulting in all vehicles (goods and passenger) and pedestrians competing for both road space and priority.

According to Ogden (1992) the relationship between freight transport and urban congestion is two-fold. Firstly, commercial vehicles delay other road users as: trucks are generally larger than cars they physically occupy more road space thus reducing capacity for other vehicles; due to their size and load weight, trucks often accelerate much more slowly than cars, which slows the overall traffic flow through congested urban areas; and lack of appropriate loading/unloading space in many urban areas often interrupts the flow of traffic as trucks are forced to load/unload at the kerbside. Secondly, other road users cause delays to trucks as: the sheer volume of traffic on the roads causes hold-ups; and stop-start traffic flows increase journey times as trucks are likely to move off from stationary slower than other vehicles. However, the problem is more obvious in the urban centres of old historic cities, that have some very narrow streets dating back to the 18th and 19th centuries (Ogden, 1992, Rye et al., 2006) such as Edinburgh and York, which were built and designed without off-street loading facilities, before motor vehicles had been invented.

Urban congestion costs the freight industry both directly through increased fuel consumption and poorer vehicle utilisation; and indirectly as it impacts upon operations. Often freight operating costs rise purely as a result of trying to avoid using the most heavily congested roads during peak travel periods (Ogden, 1992, Plant Location International Pty Ltd, 1983). For instance, using longer, less direct routes that avoid the most congested roads to reach destinations could cost companies additional driving time, additional fuel, and additional wear and tear on their vehicles. These costs then result in transport providers charging higher rates; or paying their drivers per load rather than an hourly rate in an attempt to recover some profit margins. In general, severe traffic congestion in smaller cities is limited to peak travel times in a few specific locations, whereas in the larger cities the effects are far less localised and occur for

longer portions of the day, resulting in significant internal and external costs. The Texas Transportation Institute calculated the cost of congestion in the United States of America in 2007 as \$87.2 billion, a rise of 38% since 2000 (Brom et al, 2011). With regards to the freight industry, most logistics operators are unlikely to complain, and instead will accept the congested urban network as a given, opting to plan their operations around the worst congested areas and peak times, as well as avoiding time and route restrictions (Ogden, 1977, Ogden, 1992).

2.4 Transport Demand Management (TDM) – Measures and Policies

In section 2.2 the goals of transport policy were introduced, and in section 2.3 the nature of urban freight and its intersection with these goals were explained. This section therefore examines the use of TDM measures and policies that are used by transport planners and policy makers to influence and manage travel behaviour, and their subsequent effects on freight transport.

Goodwin (1999) points out that the revision of UK road traffic forecasts conducted in 1989 that predicted traffic to double by 2025 prompted a turning point in the approach taken to transport policy and planning. With a growing number of vehicles on Britain's roads and congestion continuing to increase, it was no longer possible to build sufficient new roads to match the expected rise in demand (Banister, 2002). As such, the traditional 'predict and provide' approach was abandoned, and a new approach of 'predict and prevent' was adopted (Goodwin, 1999). It was accepted that no new road building program could cater for inter-urban traffic growth and even were that possible; there was no space for trip-ends in urban areas and no appetite for major construction. It therefore became necessary to design policies aimed at reducing the demand for road space to a level more in line with available supply (Banister, 2002); and as a result of discussions on the policy implications of the new forecasted growth in traffic and worsening congestion, demand management became the "essential feature of future transport strategy" and policy planning (Goodwin, 1999, p659).

Transport Demand Management (TDM) has been defined as "any action or set of actions aimed at influencing people's travel behaviour in such a way that alternative mobility options are presented and/or congestion is reduced." (Meyer, 1999, p576). In terms of TDM, a policy is "A broad approach towards the achievement of one or more objectives...put into practice through the implementation of one or more policy instruments" (KonSULT, 2005). Policy instruments or tools used to implement TDM may include: pricing strategies; intelligent transport systems and land use management. Ison and Rye (2008) categorised some of the more commonly implemented TDM measures as shown in Table 2-3.

Type	Policy instruments
Economic Measures	<ul style="list-style-type: none"> • Fuel Tax • Road User Charging • Parking charges • Tradable Permits • Subsidised Public Transport
Land Use Measures	<ul style="list-style-type: none"> • Strategies to restrict new developments e.g. car free • Creation of Park & Ride facilities
Informative Measures	<ul style="list-style-type: none"> • Provision of travel information • Promotion of car sharing
Substitutes for Travel	<ul style="list-style-type: none"> • Internet shopping • Working from home
Administrative Measures	<ul style="list-style-type: none"> • Parking controls • Pedestrian only zones • Alternate/flexible working patterns

Table 2-3 - Categorical List of TDM Measures (adapted from Ison and Rye, 2008)

The measures categorised in Table 2-3 are not an exhaustive list of TDM measures, and in terms of managing urban freight transport there are other TDM measures available to local authorities. Some of the more common policy measures that can be implemented as a way to regulate and manage freight deliveries in urban areas include: the introduction of strict truck operating hours to reduce traffic congestion and noise pollution; controlled emission zones (e.g. London LEZ to reduce air pollution); limiting truck access to specific locations time of day restrictions; specified lorry routes and access bans; intelligent transport systems (ITS); and physical restrictions to name a few (Ogden, 1992; Muñuzuri et al, 2005).

Often TDM is implemented with the aim of achieving long term effects on the travel behaviour of people and or goods, as a means of fulfilling much wider transport objectives. The measures categorised by Ison and Rye (2008) in Table 2-3 can be used in a variety of ways by local authorities to achieve different results. For example, since road transport is a significant source of green house gas emissions, the introduction of economic TDM measures such as strict parking controls or road pricing; combined with investment into travel substitutes such as improving high speed internet connection can work together to reduce the need to travel into urban areas. Although these measures may have a greater influence on the travel behaviour of individuals, freight transport will also be affected and may result in more consolidated loads as

operators attempt to reduce operating costs through the use of fewer, fully laden vehicles and therefore fewer vehicle trips.

Reducing traffic congestion through discouraging vehicles from using the urban road network is not currently a realistic objective, particularly for urban freight distribution due to the limited availability of alternative transport modes; however local authorities can use TDM instead to better manage the time at which travel occurs. This could be through financial incentives for travelling during off-peak hours or in the case of urban freight, controlling the times when access is permitted for loading/unloading activities. TDM can also be used to influence destinations through land use measures, such as the reallocation of road space that can restrict city centre parking and encourage the use of public transport, or alternatively by introducing one-way traffic systems that ensure traffic is directed along pre-determined routes around the city. This can help to maintain pedestrianised zones that contribute to improved road safety and local air quality improvements.

TDM is an important part of transport policy making, and its resultant effects differ between TDM that is targeted at urban logistics or freight traffic, and that which is applicable to passenger car traffic (Taniguchi and Nemoto, 2003). Since a company has direct control over a fleet of goods vehicles as opposed to car users who only have control of their own vehicle; TDM that is directed at freight traffic has the potential to generate positive effects more easily (Ibid). Furthermore, private firms are not willing to accept TDM schemes that are not profitable for them, regardless of the benefits to society in general (Ibid). However, it is important to note that TDM directed at cars may or may not have a positive impact on freight operations, and any resultant benefits or disadvantages for freight vehicles are likely to be specific to the individual measure implemented. Taniguchi and Nemoto (2003) classified TDM for urban freight transport across six key themes (see Table 2-4). In addition, the authors note that the following are important factors to take into account when selecting TDM: the size, land use, infrastructure conditions, and industrial structure of the urban area concerned.

Classification of TDM	Examples of TDM schemes
Measures addressing source of nuisance	<ul style="list-style-type: none"> • Regulating locations of facilities e.g. distribution centres • Simplifying the hierarchy of physical distribution
Change of mode	<ul style="list-style-type: none"> • Encouraging use of rail and water transport • Utilisation of underground freight transport systems
Change of route	<ul style="list-style-type: none"> • City access controls for freight vehicles • Recommending truck/lorry routes
Change of time window	<ul style="list-style-type: none"> • Time windows for granting truck access to a geographic area • Time window for loading/unloading at the curb side
Efficient use of freight vehicles	<ul style="list-style-type: none"> • Cooperative freight transport systems • Vehicle routing and scheduling using advanced information systems • Load factor controls • Logistics matching systems via the internet
Comprehensive measures (similar to TDM for passenger car traffic)	<ul style="list-style-type: none"> • Establishing freight quality partnerships • Road pricing

Table 2-4 – Classification of freight TDM (Adapted from: Taniguchi and Nemoto, 2003)

The remainder of this chapter summarises a handful of selected TDM measures to illustrate the intended impacts and their effects on freight transport. They have been chosen for reasons that include: their suitability for implementation in congested urban areas; they are either currently operating in specific urban locations or have undergone trials; and each has a significant impact on commercial logistics operations and the distribution of freight in urban areas, whether or not these impacts are well documented.

2.4.1 Time of day restrictions

There are various regulations, policies and restrictions that may be used to prohibit goods vehicles loading and unloading during a specific part of the day; others may prohibit daytime delivery of hazardous materials, or apply specific delivery time window regulations throughout a special event (TRB, 2012). For example, temporary alterations to the regular traffic and parking restrictions were imposed across London during the London 2012 Olympic Games, and many boroughs relaxed their night time delivery bans that are usually in operation between 23:00 and 07:00 hours Monday to Saturday, and all day Sundays and public holidays (TFL, 2012b).

Time windows, also referred to as time access restrictions are policies imposed by local authorities that limit activities related to commercial distribution to pre-determined times of day. Reasons for their use vary, although the most commonly cited are: to prevent goods deliveries occurring during high risk hours with peak pedestrian activity and commuter traffic (TRB, 2012); to improve the shopping climate and the

attractiveness of urban centres, so as to increase the number of visitors to the city centre and improve local economic development; to increasing the quality of life for local residents by reducing early morning noise levels; and to reduce the inconvenience caused by freight vehicles such as temporary road blocks during unloading (Quak and de Koster, 2006, 2007; Allen et al, 2004; Munuzuri et al, 2005; OECD, 2003).

Aside from positively contributing to economic development and generally improving the attractiveness of the urban environment, time window policies can have some negative impacts, which may include:

- Reduced accessibility and added traffic congestion during the morning peak hours as time windows force deliveries to take place in the morning.
- Contribute to traffic congestion as strict time windows can lead to trucks congregating on the periphery of the restricted zone to wait for the opportunity to deliver and to queue for access to premises (TRB, 2012; Whiteing, 1999).
- Increased pressure on operators to deliver within strict time windows, which cause an increased cost of delivery.
- Reduced transport efficiency for hauliers distributing goods in multiple urban areas. For example, in the Netherlands annual distribution costs rose by €270million as a direct result of current time window policies since they often coincide with morning rush hours; thereby encouraging hauliers to travel with multiple vehicles during these periods to make deliveries in urban areas that are affected by them (Groothedde et al, 2003 in Quak and de Koster, 2006).
- Contribute to increased levels of local and global pollution as night time and mid-day bans force more operators to deliver in the peak, thus delivery vehicles spend longer periods of time sitting in traffic congestion and emitting fumes that contribute negatively towards air pollution (Quak and de Koster, 2006).
- Encourage night time deliveries that increase noise disturbance to local residents and raise additional costs for retailers receiving goods during the unsociable off-hours (TRB, 2012; Quak and de Koster, 2006).

Quak and de Koster (2006) evaluated the performance of three different time window schemes in the Netherlands and concluded that existing policies designed by individual local authorities performed poorly with regard to financial, environmental and social aspects. The multi case study investigation identified that night time delivery windows can reduce morning congestion and over a 24hr period contribute towards a more

efficient use of infrastructure. If time windows are harmonized across neighbouring towns and cities operators are more likely to achieve multi-drop deliveries within strict time windows across multiple urban centres sparing retailers increased expenditure and minimising pollution that multiple vehicles would otherwise have emitted. The Netherlands Committee for Urban Distribution suggested a third scheme that demonstrates a clear policy of fairly generous time windows being applied nationwide that would significantly help to reduce the negative impacts on the environment and minimise costs. However, as all of the actors involved in urban distribution have such varying interests, there is no one scheme that is universally optimal for all the stakeholders affected by time windows (Quak and de Koster, 2006).

2.4.2 Out of hours deliveries

Encouraging road hauliers to conduct their operations outside of peak travel times (out-of-hours deliveries or off-hours deliveries – OHD's) is one method of managing freight transport demand in urban environments, since it provides the opportunity to reduce peak congestion and emissions (Brom et al. 2011; Sathaye et al, 2010; Muñuzuri et al, 2005).

The main criticism of OHDs as a solution is the impact of noise pollution on the surrounding residents and often legislation relating to noise levels and access hours is a major hurdle to more widespread adoption. Therefore prior to undertaking OHDs it is important to assess the potential noise impact and examine appropriate means of mitigation (e.g. the Barcelona night delivery scheme adopts quiet vehicle technology) so that noise disturbance in residential areas at night is minimised (Muñuzuri et al, 2005; Holguín-Veras et al., 2006; Allen and Browne, 2010; TRB, 2012).

According to a study by Holguín-Veras et al. (2006) traditional attempts to shift freight carriers to making off-hour or out-of-hours deliveries (OHDs) through freight road pricing initiatives has not achieved the anticipated positive results. This is primarily due to receivers of the goods determining delivery times, with deliveries during the daytime being preferred as staff are on-hand to accept the goods (Brom et al., 2011).

With OHDs creating additional costs to receivers for staff, security and goods handling operations, Holguín-Veras et al. (2011) and Brom et al. (2011) conducted research in Manhattan, New York City to reduce congestion through financially rewarding receivers for accepting OHDs (between 1900-0600hrs). The authors concluded five key benefits from encouraging OHDs through their proposed reward scheme:

- 1) Substantial economic benefits i.e. reduced service times and increased profitability of delivery operations leading ultimately to lower product costs.
- 2) Effective method of inducing a significant shift of urban deliveries to off-hours.

- 3) Enjoys broad based industry support as travel speeds increase and delivery times per customer reduce, with fewer parking tickets and less fuel consumption.
- 4) Large scale full implementation would achieve substantial reductions in congestion and environmental pollution.
- 5) Enhances the competitiveness of the urban economy by promoting more productive and efficient business activities.

In 2008, Douglas et al. studied the potential for OHDs in London, UK. Their results suggested that the most effective OHD strategies are likely to be those developed in partnership between local authorities and businesses so as to ensure local noise regulations are met and industry solutions are applied whenever possible.

2.4.3 Parking related policy instruments

There are a variety of forms of parking restrictions and controls, which include: control over the maximum amount of time a vehicle is permitted to occupy a parking space (or a loading bay) in a public location (usually divided into short stay and long stay parking depending on demand); restricted parking according to time of day (essentially limiting parking to resident permit holders for a portion of the day); and the reduction in the number of parking spaces in city centres.

Controlled Parking Zone's (CPZ's) have also been introduced in some city centres to help reduce traffic congestion and reap environmental benefits. These zones are a common method of parking control, used by numerous local authorities in towns and cities both across the UK and worldwide, examples in the UK include Edinburgh and Cardiff. The Edinburgh CPZ was introduced in 1974 and on street parking during the operating hours of Monday to Friday 08:30-18:30 is restricted to either resident permits or is time-limited and chargeable (Rye et al., 2006).

Parking guidance and information systems can also be used in urban centres to efficiently manage parking thus reducing traffic congestion; improving traffic flow, particularly in the vicinity of popular car parks; and also reducing levels of urban pollution that accumulates from congested and slow moving traffic; in summary to combat "the negative impacts of excess demand for parking" (KonSULT, 2005). These systems often utilise electronic display message boards to indicate to drivers locations of available parking spaces. This aims to encourage motorists to park in the first available car park with empty spaces, therefore reducing the number of vehicles circling the urban centre, and reducing emissions from stationary vehicles queuing at full car parks. As a result these systems can help cut urban congestion and reduce air pollution levels (KonSULT, 2005). This type of system is popular in the UK, and many

towns and cities have been using them for some time. For freight transport, such systems have potentially positive impacts as traffic congestion is generally reduced.

With regards to parking for deliveries, the parking related policy instruments like those described above can benefit freight and commercial vehicle operators who make regular high value journeys into urban centres. The reduction in time spent in traffic congestion helps to improve commercial freight vehicle utilization, and with fewer cars parked illegally on-street, access to delivery points is easier and loading/unloading can be more efficient (KonSULT, 2005). However, Marsden (2006) and Marsden and May (2006) point out that parking policies should not be used in isolation to develop a more efficient transport system but incorporated into local and regional transport planning processes. Therefore, parking policies that aim to provide sufficient parking facilities for commercial freight vehicles have to be consistent with the needs of urban freight in the area, as such it is not helpful to restrict loading/unloading provisions since this will likely lead to demand outstripping supply.

2.4.4 Environmental policies

Local authorities use a variety of policy measures to help improve urban air quality. With concerns over the negative effects of air pollution on public health growing in the UK, Europe and elsewhere, air quality monitoring (and policy action when permissible pollution levels are exceeded) has become a statutory requirement of local authorities in the UK. As a result of the 1990 National Air Quality Strategy, local authorities in the UK are responsible for developing an Air Quality Action Plan for controlling emissions and improving local air quality. In addition the strategy introduced the concept of Air Quality Management Areas (AQMA's), which form a zone designated by the local authority for air quality improvements with specific targets to be achieved. Therefore, with road transport emissions the most common reason for establishing an AQMA in 95% of local authorities in the UK (The Environment Agency, 2012), many local authorities are using traffic management and local transport policy measures to address air quality challenges at a local level. In the City of London, the local authority has introduced a variety of measures aimed at reducing emissions from transport, such as reducing the availability of on-street parking space in favour of short-stay public car parks with free electric vehicle charging points, and encouraging construction and delivery vehicles to turn-off their engines as opposed to leaving them idling (City of London, 2011). The UK is aiming to meet the long term goal of European policy to achieve "levels of air quality that do not give rise to significant negative impacts on, and risks to human health and the environment" (Commission of the European Communities, 2005, p11).

In Europe, environmental zones (EZ's) are a popular approach to dealing with particulate matter (PM), nitrogen dioxide (NO₂) and ground level ozone (O₃), for which road traffic is a significant source of PM and NO₂, and thereby helping to meet European air quality targets. Freight vehicles (HGV's and LGV's) are predominantly powered by diesel fuel, with the exception of approximately 3% of Britain's LGV fleet that runs on petrol (Allen et al. 2008) and are therefore a major contributor of greenhouse gas emissions. Some areas may also use EZ's to help combat traffic noise issues in the future in accordance with the EU noise directive (Joint Expert Group on Transport and Environment, 2005; Browne et al, 2005a; Dablanc, 2008). An EZ or 'low emission zone' (LEZ) as they are sometimes referred to is a geographical area that only vehicles which meet specified emissions criteria can enter. The main purpose of an EZ is to improve air quality in the area by reducing vehicle pollutant emissions, which is achieved by restricting the most polluting vehicles from the area, or by charging them for entering the EZ if their emissions are over a pre-set level in order to reduce the numbers of such vehicles accessing the area. The format of an EZ varies according to its objectives, geographical coverage, times that the EZ is in force, vehicle emission standards criteria, type of vehicle applicable, and the implementation and enforcement approaches adopted (Browne et al. 2005a; Allen and Browne, 2010).

There are several EZ schemes in operation in European cities and regions (Allen and Browne, 2010; Browne et al. 2005a; LEEZEN, 2008; Dablanc, 2008; Stathopoulos et al, 2010) examples include: Stockholm, Gothenburg, Malmo and Lund in Sweden that target diesel lorries and buses over 3.5tonnes; 29 German schemes established in 2008; many Italian LEZ schemes with varying standards and time periods, mostly are in the North of Italy and the Limited Traffic Zone in Rome's historic centre; London in the UK established its LEZ in 2008, which is the largest EZ in Europe; and EZ's are planned for the Norwegian cities of Bergen, Oslo and Trondheim.

Prior to the implementation of London's LEZ, Browne et al (2005a) surveyed fifty-five goods vehicle operators about how they intended to meet LEZ criteria should one be established in London. The results of this survey showed that most companies would ensure compliance by modifying existing vehicles; deploying existing vehicles used elsewhere that already meet the emissions standard; or buying new vehicles. In the same survey it was revealed that the cost implications of preparing a vehicle fleet for the LEZ was a greater problem for smaller operators, whose replacement cycles tend to be much longer than for larger firms. Browne et al (2005a) also pointed out that the anticipated costs for vehicle operators to meet the LEZ criteria were likely to be significantly higher than the costs associated with setting up the LEZ scheme across Greater London.

The introduction of LEZ schemes also provides the opportunity for more sustainable urban freight transport innovations to be implemented. For example, in Utrecht an LEZ was established across the city centre in 2007, which prompted the introduction of the electrically powered Cargohopper and greater use of the Beerboat (CIVITAS Mimosa, 2013). Both these innovations have contributed to reduced emissions and noise pollution in Utrecht, by reducing the total number of diesel powered freight vehicle trips (Ibid). Both the Cargohopper and Beerboat are discussed in more detail in chapter three, as examples of innovative solutions being used to tackle urban freight problems.

2.4.5 Urban Consolidation and Transshipment centres

Browne et al. (2005b, p4) define an urban consolidation centre (UCC) 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 (e.g. shopping centre), from which consolidated deliveries are carried out within that area”. In addition, UCC’s can provide a range of value-adding logistics and retail services. Various other terms are used to refer to an UCC, including consolidation terminal, transshipment centre, and goods distribution centre (Ogden, 1992).

From a local authority perspective, the main advantage of introducing an UCC scheme is that they can be used alongside other demand management measures to produce wider benefits. For example, many UCC schemes are linked with city centre time of day or vehicle weight restrictions, and therefore the dedicated fleet of urban collection and delivery vehicles can be restricted to vehicles that best meet the requirements of the urban area concerned.

Implementation and consideration of UCC schemes has been most popular in Europe, with the use of proposed schemes being either compulsory for delivering within a designated area or voluntary, whereby a range of incentives are used to promote their use (Ogden, 1992; Whiteing, 1999). The European ‘Best Urban Freight Solutions’ (BESTUFS) project investigated ways in which freight can best improve the urban environment, one of its recommendations was the use of UCC’s. The project sought to identify the crucial factors involved in the successful operation of an UCC, noting that they should be organised and operated by at least one key commercial player to highlight to potential users of the scheme the likely benefits of being involved (Huschebeck and Allen, 2005; European Communities, 2006). In Germany, ‘City logistics’ schemes have emerged in a number of locations where companies involved in urban freight work have signed agreements to cooperate in distribution, dividing the work and revenue on a formula basis to reduce inefficiencies (Whiteing, 1999; Bendel, 1996).

A number of research studies have evaluated the impacts of introducing a UCC for freight. Amongst the key findings, it was determined that UCC's can reduce the time taken to make on-street deliveries because loads are consolidated for delivery in specific areas (Allen et al, 2012; Browne et al, 2005b). However, the overall effect on road freight activity for a particular urban area depends on the proportion of goods destined for that area coming through the UCC (Allen et al, 2012). Also, the double handling of goods resulting from the transshipment between vehicles incurs increased costs for operators and is often a reason for operators choosing not to use an UCC. However, Allen et al (2012) highlight that these perceived additional operating costs can be counter balanced by reduced time spent by vehicles in congested urban areas, improved journey times and increased vehicle utilization. In addition, driver's time can be used more efficiently, as the use of a UCC often eliminates the transporting of goods on foot from a loading bay to a recipient's premises located some distance away in a pedestrian zone (Ibid).

2.4.6 Physical restrictions

Local authorities in the UK are usually responsible for planning and implementing physical restrictions in urban areas. Physical restrictions imposed may include: road closures; re-prioritization of existing road capacity; load factor controls such as maximum weight limits; and the introduction of traffic calming aimed at reducing car use, improving the environment and overall to reduce traffic congestion on specific urban routes (KonSULT, 2005).

In most cases, restrictions are favoured over the construction of new roads, because new roads are thought to increase congestion problems by encouraging more vehicles to use the extra capacity made available; and also implementing physical traffic restrictions is most often the financially cheaper option compared with building new roads and implementing new traffic control systems. Physical restrictions such as road humps and road narrowing are considered an effective way of reducing vehicle speeds in urban areas (Scottish Executive, 2006) and are popular traffic calming measures used by local authorities. However, in some locations, reduced road capacity by physical restrictions causes increased traffic congestion, and on routes regularly used by commercial freight vehicles that are making high value journeys, the efficiency of freight movement will reduce as vehicle utilization is lowered (KonSULT, 2005).

Local authorities commonly impose load factor controls (often referred to as 'weight limits') on geographical sections of the urban road network as a way of improving traffic conditions. Taniguchi (2003) defines load factors as "the weight of goods carried by a truck divided by the capacity of the truck in terms of weight, volume or other units". Freight transport operators use load factors as a key performance indicator for

measuring the efficiency of freight transport, which improves with load factor capability (Visser, 1999; Taniguchi, 2003). In urban areas however, load factors have been decreasing as demand for more frequent deliveries of small shipments has risen due to the popularity of low inventory and just-in-time ordering policies. Whiteing (1999) suggests that severe gross weight limits be avoided in an effort to achieve greater load consolidation, thereby reducing the total number of commercial vehicles entering urban areas.

In the UK, London has been quite instrumental at introducing physical restrictions to manage traffic flows, creating specific routes for vehicles to use, including the introduction of the 'red route' which prohibits stopping at all times to maintain better traffic flow. However, the red route makes essential freight deliveries to businesses located along its busiest stretches difficult, particularly premises where access is limited to the main front entrance, and where stopping outside is prohibited.

2.4.7 Urban traffic control systems

Urban traffic control systems are a type of traffic management system that is designed to 'integrate' and 'co-ordinate' traffic light signals across a large area of road network to control and manage the flow of traffic. These systems aim to achieve optimal traffic flow on the road network through minimising delays and the number of stops per vehicle at traffic light junctions. When urban traffic control systems are operating, more vehicles may be encouraged onto the road network, however congestion reduces with improved traffic flow and fewer delays, which benefit all motorists (KonSULT, 2005).

Urban traffic control systems are operating in towns and cities all around the world, in a variety of forms with a range of different uses. KonSULT (2005) list their possible uses: "balancing capacity in a network"; acting to both "attract and deter traffic from particular routes or areas"; prioritising specific vehicle categories such as public transport on guided bus routes; and even to orchestrate queuing traffic on suitable parts of the road network.

Wood (1993) reviewed two types of urban traffic control system operating in the UK; fixed time systems, and traffic responsive centralized systems. Fixed time systems use pre-calculated timing plans to limit traffic capacity at specified times of day in order to minimize delays on the road network. Traffic responsive centralized systems react accordingly to changing traffic demand and variations in traffic flow over the course of the day, for instance the system uses traffic detectors to respond to unexpected incidents (KonSULT, 2005). Similar traffic responsive systems are used in the USA, but in place of a centralized control room there is a network of controllers that communicate with each other (KonSULT, 2005).

As a tool for urban traffic and congestion management, SCOOT (Split Cycle Offset Optimisation Technique) has been proven to reduce delays and levels of urban congestion, which in turn reduces harmful emissions from vehicles in the controlled SCOOT managed zone (Peek Traffic Limited et al., 2000-2008). In urban areas worldwide local authorities employ the SCOOT system to minimise traffic congestion through control of traffic signals. SCOOT is working effectively in over 170 UK towns and cities including York, Coventry and Preston; as well as Bangkok, Thailand; Beijing, China; and Toronto, Canada (KonSULT, 2005). Toronto introduced SCOOT in 1993, and results from a 'before and after' study showed that it had reduced journey times by an average 8%; delays reduced by an average 17% and stops reduced by around 22%. In 2001, the City of York launched an Urban Traffic Control System to manage and reduce the city's congestion. York's system uses a network of wireless communication to enable remote monitoring and control of traffic signal locations to assist the management of traffic flowing around the city (Peek Traffic Limited et al., 2000-2008). The system gathers data from around the city on the road network and atmospheric pollution levels so as to inform the selection of appropriate traffic control, access control, enforcement and information strategies; which ultimately assists the public to make informed decisions on the best modes of transport to use, routes available and the best times to travel, thereby helping to reduce the city's traffic congestion and air pollution (Envitia, 2013).

Current policy objectives can be influenced with the use of urban traffic management schemes, particularly objectives relating to transport efficiency through improved reliability and reduced delays, prioritizing vehicles, and reducing air pollution to better protect the environment. However, only a small benefit has been identified for commercial freight traffic, which is namely the reduction in congestion on primary routes that improves the efficiency of vehicles engaged in multi-drop deliveries in the central business district (KonSULT, 2005).

2.4.8 Lorry management schemes

Lorry management schemes aim to reduce noise pollution, damage to infrastructure and the environment in a given area. Section two of the 1984 Traffic Regulation Act gives local authorities the power to introduce measures aimed at reducing the impact of lorries on the local environment, and the legal right to control the use of 'through routes' used by commercial Heavy Goods Vehicles (HGV's) by means of imposing restrictions relating to the use of HGV's on such roads (KonSULT, 2005).

Methods of reducing the impact that lorries or HGV's have on urban communities and the environment can be divided into two main groups: lorry routes, and lorry bans. Firstly, lorry routes can be used by local authorities in one of two ways. Either, with the

use of 'positive routing' (essentially advisory signed routes for HGV's to take) or through 'negative routing' (i.e. lorry bans on certain routes). The second is the most commonly used method of controlling through routes in urban areas, it sets out areas of the road network or zones which lorries are prohibited from using (with the exception of allowing access to premises for loading/unloading).

Lorry bans have been enforceable in the UK since the 1984 Road Traffic Regulation Act was introduced, enabling many local authorities to ban lorry traffic in particular areas. For example, height restriction barriers are used to warn vehicles of any physical restrictions on the road ahead, such as low bridges; width restrictions can also be imposed, especially in areas where large HGV's could become trapped due to lack of adequate turning space; and the use of signs to warn and prohibit HGV's using weak bridges.

The combined use of lorry routes and bans is expected to help relieve some urban congestion problems; increase accessibility to previously congested areas; increase safety along specified routes and improve the environment in a particular area. Unfortunately, for large scale freight operators and commercial traffic the impacts are likely to be less positive. Lorry management schemes will increase journey times due to routing away from certain areas or taking longer routes to avoid bans, which in turn raises operating costs. Small businesses in the areas where lorry management schemes operate are likely to suffer increased delivery charges as hauliers try to compensate for higher operating costs whilst attempting to maintain a profit (KonSULT, 2005). From a planner's perspective, the implementation of urban transport policies such as 'negative routing' aims to improve the efficiency of commercial HGV's operating in urban areas through facilitating better access and vehicle movements. As HGV operations become more efficient, it is hoped that fewer vehicles will be required to operate in urban areas (KonSULT, 2005); however in reality there is little documented evidence of negative routing providing an effective solution.

In an effort to balance the needs of local industry and protect the local environment, Oxfordshire County Council (2009) documented optimal routes for lorry traffic to access major destinations throughout the county. A map of preferred lorry routes across the county was created by the Oxfordshire Freight Quality Partnership, which also highlights areas that are unsuitable for HGV's. In addition, a detailed map of lorry restrictions and routes for deliveries within Oxford city centre has also been produced by the council, although there are no available results to demonstrate the effectiveness of this mapping.

Combined bus and lorry lanes are another measure used to control the routing of HGV's around urban areas. In 1992 Newcastle City Council introduced such a scheme to aid the movement of essential goods and passenger traffic, with subsequent further 'no-car' lanes (DFT, 2006; McLeod and Cherrett, 2009) although to date there has been little documented evaluation of the benefits of such a scheme. A number of authorities are introducing local advisory routing schemes for lorries, which highlight preferential routes for HGV traffic in and around town centres; retail parks; industrial estates; and other urban locations which experience high volumes of HGV traffic, however the success of these schemes requires co-operation from local businesses and good publicity (KonSULT, 2005).

In April 2009, a Lorry Management Zone (LMZ) was implemented in the Cotswolds (UK), it bans vehicles over 7.5 tonnes (HGV's) from travelling through a geographic area of 164 square miles, between Cheltenham and Gloucester in the North and Cirencester and Stroud in the South. The only exemptions to the ban are the emergency services; access; and HGV's owned by local businesses in the area. Ian Gallagher, Policy Manager for the Freight Transport Association (FTA) in the Southwest believes the LMZ is far from efficient in terms of fuel and travel time costs as lorries have to travel greater distances around the zone, which also impacts the environment (The Chartered Institute of Logistics and Transport in the UK, 2009).

2.4.9 Urban road user charging – congestion charging – road pricing

Charging methods vary from 'Road Pricing' in general that charges motorists directly for driving on a particular road or through a particular area, to 'congestion charging' that includes a "higher rate" price for travelling during peak congested times (Victoria Transport Planning Institute (VTPI), 2008). The most commonly adopted charging schemes are: point or toll charging; cordon charging; and area charging. Point charging is simply where "a charge is levied to pass a point on a road" (KonSULT, 2005), often cordon charging is adopted in conjunction with a point charging system. Cordon charging (also referred to as toll rings) consists of "a series of charging points...established at all entries to a given area (often a city centre)" (KonSULT, 2005). Area charging is a variation of cordon charging where "a charge is levied to use a vehicle within a defined area, rather than just to enter it" (KonSULT, 2005). The advantage of an area charge is its ability to influence all vehicle journeys within a specified area as opposed to just those that enter via the toll.

Governments and local authorities who have implemented or are planning to implement urban road charging schemes generally have three main objectives for doing so. The first is to reduce urban traffic congestion (including controlling and managing the levels of traffic both within and entering congested locations). Secondly,

to use charging schemes as a way of reducing air and noise pollution caused by high traffic volumes, thus improving the quality of the local environment. The third objective is to generate revenue; however the issue of how this revenue should be spent is often disputed.

In the UK, the most significant example of a road charging scheme is the London Congestion Charge (LCC), which was introduced in 2003 to reduce overall traffic levels and congestion in the capital. In 2012 Transport for London (TfL) reported that the total number of vehicles (per month) entering the charging zone during its operational hours had fallen from over 5.6million in July 2010 to approximately 3.9million in October 2012. Although the most significant fall occurred between December 2010 (5.3million) and January 2011 (3.6million) which is directly attributable to the removal of the Western Extension at the end of December 2010 (ibid). Whilst the LCC serves to reduce overall traffic levels and resultant atmospheric pollution in the capital, and has been successful in encouraging greater use of public transport alternatives; it also has the potential to improve the efficiency of urban freight through a more efficient use of freight vehicles, for instance through reduced empty or part-load running due to the higher cost of operating in London (MDS Transmodal, 2012). As such, the most recent annual impacts monitoring report (sixth) published by TFL (2008) reports a general year on year decline in traffic (including goods vehicles) entering the charging zone. The report also highlights that since the initial reduction in emissions levels observed in 2003, the growth in traffic volumes over subsequent years of the charging scheme's operation has offset the benefit from cleaner vehicles brought in as fleets are renewed. This is partly motivated by the LEZ which enforces commercial vehicles to meet strict emissions criteria, as well as discounts and exemptions relating to the congestion charge for the use of greener electric and hybrid vehicle technologies.

With regards to commercial freight activities, urban road user charging schemes have the potential to positively impact on vehicle efficiency. For example, a vehicle conducting multi-drop deliveries may be able to achieve a greater number of deliveries per day, due to fewer congestion related delays. This can present a significant benefit for HGV drivers who are subject to drivers' hours regulations and working time legislation, which limits the amount of daily driving time. However, when other TDM policies are combined with an urban area congestion charge, such as the London Lorry Ban, delivery time windows can be very limited, which is not an integrated outcome.

2.5 Chapter Summary

This chapter has introduced the key objectives of urban transport policy that encompass the economy; operational efficiency; road safety; the environment; urban

form and infrastructure. Overall, urban freight policy aims to reduce the social costs associated with distributing goods and services in urban areas (Hicks, 1977), whilst the goals of urban freight are to distribute goods and services in a timely and efficient manner in order to meet customers' demands thereby producing a profit for logistics operators. The varying degree of influence over urban freight policies in the UK that different levels of governance (from the EU to local authorities) have reflects the diverse and complex nature of policy making in the transport sector. The selection of TDM measures and policies which have been discussed in the preceding sections of this chapter illustrate how some of the solutions introduced by local authorities may have a global benefit to the transport system but sometimes incur a range of dis-benefits to freight. Especially since the majority of these TDM measures and policies are for implementation by local authorities, predominantly on a local or regional scale for which freight operators have very little or no influence over these decisions. However, one way in which freight operators can positively improve the operational efficiency and productivity of their vehicles is through the application of ITS tools such as vehicle fleet management systems. These can be used by operators to monitor driver and vehicle performance data, enable vehicle tracking and update navigation systems with real-time traffic information (DFT, 2003). Overall, such applications of ITS have the potential to benefit both the companies using them as well as their customers further down the supply chain with cost savings and operational efficiency improvements that include: reduced mileage, better fuel consumption and improved journey time reliability (KonSULT, 2005).

Often local authorities are faced with the tough challenge of creating urban transport policy that is capable of satisfying conflicting goals. Hesse (2004, p1049) gives the example of the "goals of economic competitiveness and improving quality of urban life" that are difficult to achieve through a single policy strategy. The summary Table 2-5 highlights suggested positive (+ve) and negative (-ve) impacts of the TDM policies outlined in the previous sections of this chapter, which have been determined from the reviews of available literature. Each policy has been evaluated in terms of its impact on both global transport objectives and freight objectives. The boxes that have been left blank in the table represent a lack of supporting evidence to determine a significant positive or negative impact on the factors relating to the urban transport policy objectives discussed. This highlights that despite much research into general urban transport policies, there remains a significant lack of evidence regarding the impacts and effectiveness of policies relating to the management of freight transport. Furthermore, details of impacts on freight and the tensions between freight and other road users are not always clear and well evidenced; with some policies having a clear

impact on more global transport objectives (such as emissions, pollution and levels of traffic congestion) which may not have a positive impact on the objectives of freight operations (such as load factors and operating costs). It is also worth noting that the scale of urban policy implementation can also be problematic, since often freight transport operators make decisions that go beyond operations carried out in urban areas. Therefore, the second aim of this research project was to identify the most common TDM measures applied with regards to urban freight and to understand their impacts on urban freight operations.

Impacts on TDM Policy	Global objectives				Freight objectives		
	Emissions/ pollution level	Noise	Safety	Congestion	Load factors	No. of vehicles	Operational costs
Time of day	+ve	+ve	+ve	+ve		-ve	-ve
Out of hours	+ve	-ve		+ve	+ve		-ve
Controlled parking zones	+ve			+ve			-ve
Parking guidance	+ve			+ve			+ve
LEZ's (environmental zones)	+ve	+ve		+ve		+ve	-ve
Urban consolidation	+ve			+ve	+ve	+ve	-ve
Weight limits				-ve	-ve	-ve	-ve
Road humps and narrowing				-ve	-ve		-ve
Route restrictions	+ve		+ve	+ve			-ve
Urban traffic control	+ve			+ve			
Lorry management schemes	+ve		+ve	+ve	+ve	+ve	-ve
Urban road user charging	+ve			+ve		+ve	-ve

Table 2-5 Suggested impacts of TDM policies relating to freight transport

The subsequent chapters three and four follow on from the urban transport policy challenges explained here. Chapter three looks at how urban freight is currently being addressed and planned for by local authorities; highlights some of the problems relating to urban freight and reviews some potentially innovative urban freight solutions. Chapter four provides an overview of decision analysis and discusses five conceptual decision making frameworks for transport planning. In addition, a selection of decision analysis methods and their potential for use in collaborative decision making, which have helped to inform the creation of a facilitated workshop method (explained in chapter five) for involving more stakeholders in urban freight transport planning decisions have been reviewed.

3 Chapter Three – The current state of urban freight

3.1 Introduction

In Chapter Two, the challenges of implementing urban transport policy that satisfies the often conflicting goals of both freight and non-freight users of the road network were examined. This was followed by a discussion on selected TDM measures and policies which were used to illustrate that whilst these measures can be used to address general transport objectives they can have a potentially negative impact on freight transport activities.

This chapter begins by outlining the relative importance of urban freight and its role in sustaining the economic growth that is associated with towns and cities. This is followed by a discussion pertaining to the dominance of road transport in the UK and its important role in urban freight; which leads to some of the common problems caused by freight relating to traffic congestion and the environment. A number of European research projects aimed at addressing these issues from which a selection of innovative urban freight solutions have resulted, have also been reviewed. The remainder of the chapter explores a selection of unique and location specific alternatives to traditional urban freight distribution by road vehicles, which present examples of practical solutions to addressing problems related to urban traffic congestion and environmental issues. These solutions highlight the need for greater joint working between local authorities and private sector freight businesses, so that new and existing policies can be reviewed to help facilitate the successful implementation of innovative solutions.

3.2 The role and nature of urban freight

“Throughout history, urban areas have been magnets for people seeking greater opportunity” (Ziv and Cox, 2007, p2) and this remains true today as ever increasing numbers of people migrate to our towns and cities. In the western world, a large proportion of the population resides in the urban environment, with 72% of the European population now classed as urban dwellers, a proportion that is predicted to rise to 84% by 2050 (European Commission, 2009). Many of those choosing to live in towns and cities are attracted by the possibility of better employment prospects and easier access to a greater number of amenities. Urban logistics provides a key part of the support structure behind such benefits, by distributing goods from where they originate to where they are needed, at the time when they are needed.

An important part of supporting and sustaining urban life is the distribution of goods sourced from far and wide to various locations in and around towns and cities. Ogden (1992) explains that having large numbers of people clustered together in urban areas means that a vast proportion of the population is “remote from their sources of food, sources of raw materials for industry, markets for industrial products, and places to dispose of their waste”. Therefore, as explained briefly in the previous chapter (section 2.3), urban freight varies widely and may include anything from: the delivery of manufactured goods to retail stores; catering supplies to restaurants, bars and public houses; delivery of sub-components between manufacturers; supplies to schools, hospitals and public buildings; street cleansing services such as refuse collections; shipment of building supplies (i.e. sand and gravel) from quarries to construction sites; petroleum products to service stations; and courier, mail and parcel deliveries to commercial and domestic properties (IHT, 2005; Ogden, 1992).

It should be recognised that the requirement for urban freight movements is directly linked to the rising population and sustained economic growth that occurs in urban areas. Therefore, the demand for goods influences the demand for freight. As Button and Pearman (1981, p35) explain the demand for freight is derived demand, since “the demand for freight transport arises because firms use it as an input, either to their production processes (incoming raw materials), or to their distribution (taking their production to shops, customers or other firms), or both”. Ogden (1992, p61) further emphasises this, explaining that freight is “essentially an economic activity”, since goods do not “move for their own sake; they are moved only if they are greater value at some location other than their present one”. Hence, the volume of goods being moved from, to, and within urban areas is a reflection of the current social and economic activities occurring within society.

Anderson et al. (2005) and Browne (1997) cite the works of Meyburg and Stopher (1974); Hassell et al. (1978); and Ogden (1992) to highlight a number of reasons why urban freight transport is important. These include:

- It plays a fundamental part in sustaining our existing lifestyle.
- The role it plays in servicing and retaining industrial and trading activities, which are essential major wealth generating activities.
- The contribution that an efficient freight sector makes to the competitiveness of industry in the region concerned, and the negative effect on a region if its industries are rendered uncompetitive due to poor freight services.

- The effect of freight transport and logistics costs on the cost of commodities consumed in that region.
- The total cost of freight transport and logistics is significant and has a bearing on the efficiency of the economy.
- The environmental effect of urban freight movements (in terms of energy use and environmental impacts such as pollution, noise, and visual intrusion).

3.2.1 The growth and dominance of road freight in the UK

The above mentioned growth in urban population reinforces the demand for goods and services to be readily available, which therefore requires an efficient goods distribution network. Over ninety per cent of road freight activity in the UK is carried out by HGV's (over 3.5 tonnes gross vehicle weight); whilst the remainder is attributable to LGV's, which mainly include vans not over 3.5 tonnes gross vehicle weight (DFT, 2012b). However, the number of vans (LGV's) on Britain's roads is growing, as can be seen in Figure 3-1, which compares the growth in van traffic with HGV's on Britain's roads since 1993.

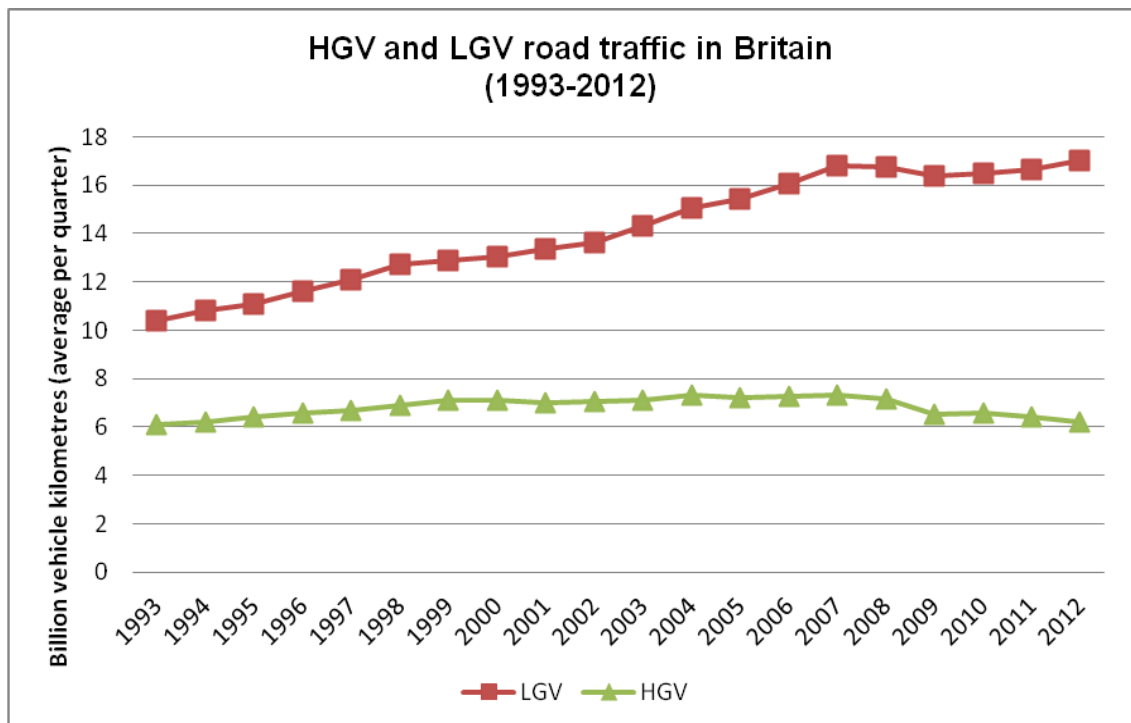


Figure 3-1 HGV and LGV road traffic in Britain 1993-2012 (DFT, 2013b)

This is supported by DFT traffic count data that revealed of the vehicle kilometres travelled by goods vehicles on Britain's roads in 2011 (Table 3-1), urban roads accounted for 36% and 15% of the total distances travelled by LGV's and HGV's respectively (DFT, 2012c). This reflects the growing significance of Britain's LGV fleet in urban areas, where they are most often used for distributing high-value, time

sensitive goods such as parcels, cash in-transit, and temperature controlled goods; as well as for carrying out maintenance and service related operations (Allen and Browne, 2008).

Road Type	LGV Vehicle kilometres (billions)	HGV Vehicle kilometres (billions)
Motorways	12.5	11.2
Urban 'A' roads	9.9	2.6
Minor urban roads	14.0	1.2
Rural 'A' roads	19.3	9.3
Minor rural roads	10.8	1.4
All roads	66.6	25.6

Table 3-1 LGV and HGV vehicle kilometres in Britain by road type for 2011 (DFT, 2012c)

Freight transport activity is measured according to either 'goods lifted' in tonnes, or in tonne kilometres, also referred to as 'goods moved', which takes into account the distances travelled. Goods moved is calculated by multiplying the weight of the load in tonnes by the distance it is carried in kilometres (DFT, 2012b). Road freight in the UK has been increasing over the past twenty years. In 1990, approximately 1,750 million tonnes were lifted over 136 billion tonne/km, which rose to a peak of just over 1,953 million tonnes that were lifted over 160 billion tonne/km in 2009 (DFT, 2012c). It is worth noting that there was a twenty four percent decrease in the amount of freight lifted and distance it is moved over during the period of 2007 to 2009; although this is most likely attributable to the economic recession. It is expected that the amount of freight travelling on Britain's roads will rise again. The graph below shows the historic growth of freight transport in the UK over the past twenty years, which reflects a general upward trend of goods being lifted by HGV's (DFT, 2012c).

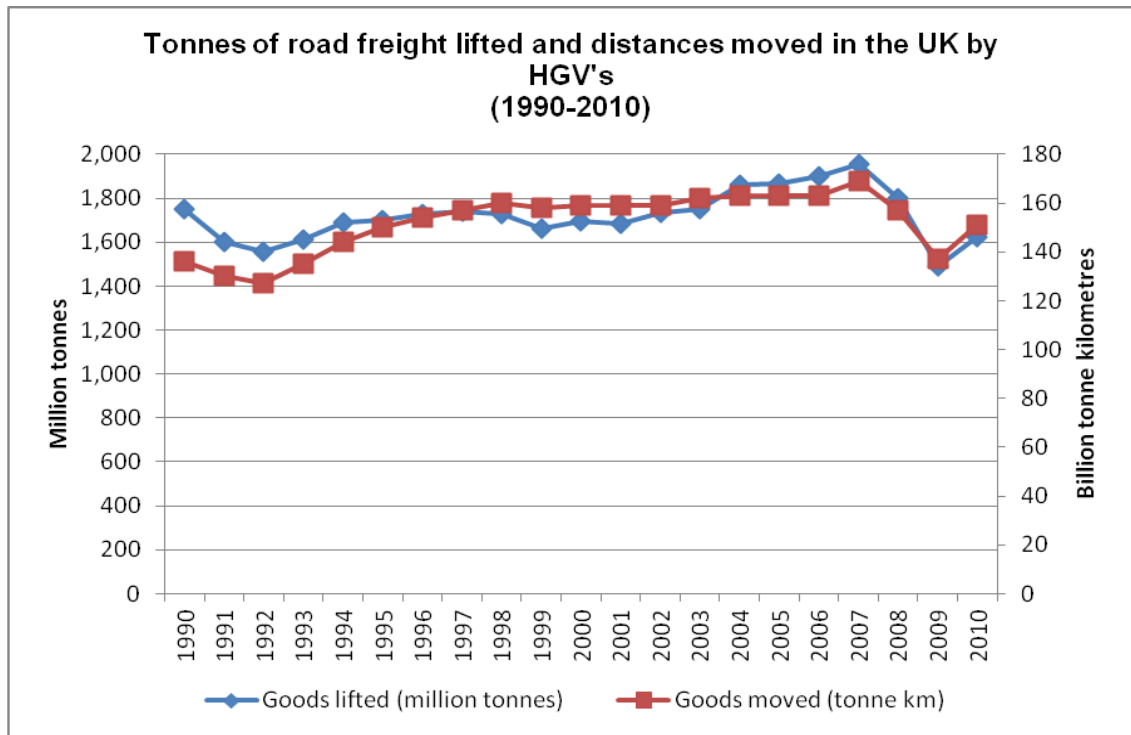


Figure 3-2 Tonnes of road freight lifted and distances moved by HGV's in the UK 1990-2010 (DFT, 2011c)

Currently, the distribution of goods in the UK is dominated by road freight transport, and in 2010, the road freight sector accounted for approximately eighty two percent of the total amount of tonnes lifted, compared to five percent on both rail and water transport, and eight percent by pipeline (DFT, 2012c). The percentage modal split for road freight in the UK has remained relatively stable throughout the last decade at just over 80% as can be seen in Figure 3-3. Road freight is also the dominant mode for domestic goods transport across the EU, with almost seventy three percent of inland freight in 2010 travelling by road, compared to sixteen percent by rail (European Commission, 2012).

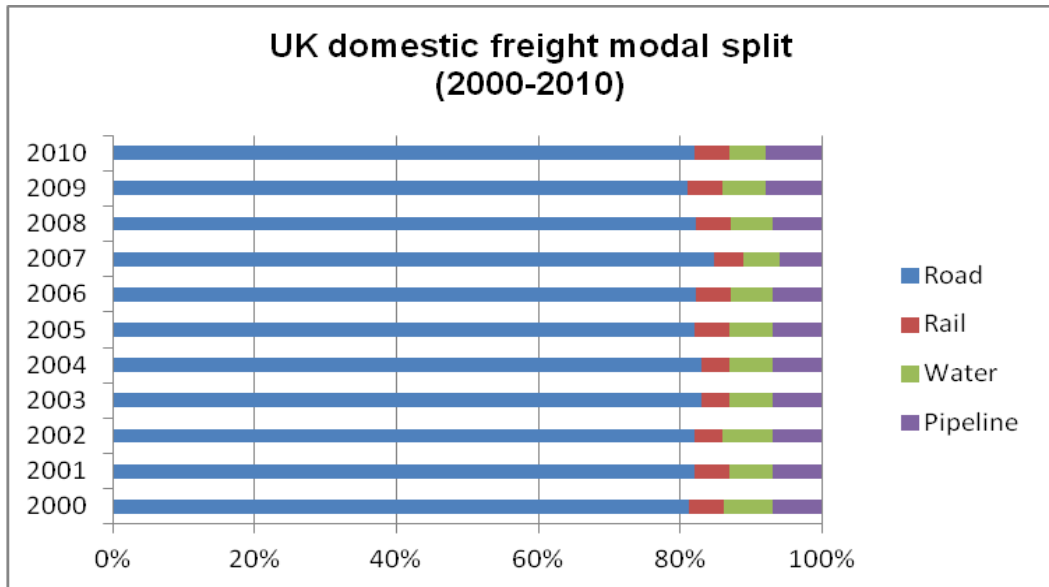


Figure 3-3 UK domestic freight (2000-2010) modal split (DFT, 2012c)

These statistics highlight the UK's reliance on road haulage for supporting the economy and social well-being of the population (Piecyk and McKinnon, 2007). The high percentage of goods lifted by road freight in the UK is perhaps an indicator of the high degree of flexibility it provides for British industry. It provides businesses with the flexibility to locate to areas that are not serviced by a rail siding, port or airport; as well as providing their clients with the flexibility to schedule deliveries to suit their needs, as opposed to relying on other modes that operate on fixed timetables (House of Commons Transport Committee, 2012). This is particularly relevant for urban freight, since many retailers and city centre businesses serviced by road freight are able to schedule deliveries during normal business hours.

3.2.2 The last mile and urban deliveries

The majority of towns and cities, whilst being well connected to the road network, provide very few opportunities for moving shipments of goods destined for urban areas via alternative modes such as rail or waterway. Consequently road transport is the only mode that is able to provide a complete door to door service from the warehouse to high street retailers, city centre businesses and consumers; which makes it the most appropriate mode in terms of cost, efficiency and time reliability (FTA, 1997). As such, road transport has become even more dominant as the mode of choice for 'last mile' deliveries to customers, which is mainly due to the fact that "almost without exception, freight generating and receiving locations (including households) are directly connected to the road network, so road is an almost universally available option for moving goods between businesses and from businesses to consumers", in contrast to the more limited availability of other modes such as rail or water (DFT, 2010b, p3).

In order to determine the potential for urban goods movement by different modes Meyburg and Stopher (1974) cited in Browne (1997) classify four types of urban freight flows. Firstly, shipments into an urban area for consumption within that same area; secondly, shipments of goods out of an urban area where they have been produced; thirdly, collection, delivery and distribution of local goods within a single urban area; and lastly, brief, through-traffic movement of goods, including those temporarily stored before being transhipped for onward distribution beyond the urban area. Although, according to Browne (1997, p107) “the relative importance of each type of movement will depend on the range of functions within a given city or urban area together with such factors as location and type of industry and whether, for example, the city contains a major port or airport”. Therefore, despite greater opportunity for using alternative transport modes to ship goods into and out of an urban area, where port or rail freight terminals can be utilised, road freight remains the dominant mode, particularly for urban goods distribution and last mile deliveries (Allen et al, 2007; Browne, 1997).

3.3 Problems associated with urban freight

In 1977, Hicks conducted one of the earliest studies into urban freight in which he identified and provided descriptions of three key factors contributing to the urban freight problem: the under-utilization of goods vehicles, traffic congestion and the lack of adequate loading/unloading facilities. As part of this study, Hicks (1977) was also able to draw attention to the various costs that freight transport incurs, which include transport operating costs, community costs, external costs, and urban infrastructure costs.

More recently, the combination of high population densities that incur and maintain a high demand for goods and services in urban areas, and the limited opportunities to expand or improve urban road infrastructure have led to an amplification of the problems associated with urban freight (Stanchev and Whiteing, 2006). These include: traffic congestion, environmental issues (i.e. pollution and green house gas emissions), and traffic safety and accidents (Stanchev and Whiteing, 2006; Konstantinopoulou, 2010; Allen et al, 2010). As the tendency for just in time replenishment grows, Konstantinopoulou (2010) reports that these issues are becoming more severe, which has further fragmented the volume of goods being delivered at once by one vehicle; therefore, resulting in a rise in the number of less than full goods vehicles operating in urban areas and an increase in emissions from freight vehicles. As well as having a negative effect on society, in terms of health implications and decreasing quality of life, the impacts of these problems hinder the efficiency and effectiveness of logistics and transport operations in urban areas (Stanchev and Whiteing, 2006).

Generally local authorities attempt to solve these problems or minimize their impact by imposing restrictions in order to manage urban freight. Many cities have introduced a variety of transport demand management measures and policies, as previously discussed in Chapter Two. Although there are many examples of TDM measures and policies that can negatively impact on urban freight operations, it is also important to note that freight movements can cause some of the problems experienced in urban areas. In particular, freight can have a significant impact on traffic congestion in the urban area as well as being a source of negative environmental impacts. The next two sub-sections discuss urban freight's impact on traffic congestion and the environment in more detail.

3.3.1 Urban freight and traffic congestion

In urban areas particularly, freight transport both contributes to traffic congestion and is affected by it. As urban areas expand and the number of people migrating to towns and cities continues to grow, urban traffic congestion increases; which as Anderson et al. (2005) explains, hinders improvements in the efficiency of freight operations. Whilst goods distribution in cities contributes significantly to the rising levels of traffic congestion it is largely neglected by local authorities, who instead focus their research and planning on passenger transport (Hensher and Puckett, 2005). The DFT (2008) suggests that congestion most often occurs at "pinch points" on the road network, and that its localised and sporadic nature makes it very difficult to evaluate freight's contribution to road congestion.

For every HGV on Britain's roads, there are an estimated sixty cars registered, which means that cars and HGV's share responsibility for congestion caused by insufficient capacity on the road network (DFT, 2008). For example, when an HGV or van is engaged in loading / unloading activities, a common occurrence in urban areas, the congestion caused can reduce the road capacity by up to fifty percent overall, which doubles to one hundred percent in one direction (ibid). The resulting delays caused by traffic congestion contribute to a further problem for all users of the road network – unpredictability, and therefore unreliability of journey times, that according to the DFT (2008) is a far greater issue than overall journey time.

Policies used to curb congestion are mainly of a regulatory nature and local authorities apply a host of measures such as parking restrictions, public transport subsidies, and the reallocation of existing road space to tackle urban congestion. However, a more severe policy measure that is frequently examined by governments and discussed by researchers to combat this problem long-term is the implementation of congestion charging schemes. As explained in the previous chapter two (section 2.4.9) congestion charging schemes force drivers (or fleet operating companies) to pay a fee to access a

particular geographical area during a set time period; thus the objective being to reduce levels of traffic congestion on roads within the charging zone (Anderson et al. 2005). Although the objective of reducing traffic congestion is high on government policy agendas, the role of congestion charging schemes and their effectiveness in delivering benefits to urban freight distribution are poorly understood.

A study by Holguín-Veras et al (2006) attempted to investigate the impacts of time of day road pricing schemes in congested urban areas on the behaviour of freight operators, using the Port Authority of New York and New Jersey (PANYNJ) as a case study. The results revealed that freight operators are often significantly restricted in how they can respond to such a policy. For many of the operators interviewed, constraints imposed by their customers for peak time deliveries make it difficult for them to switch to and make use of the off-peak operating hours encouraged by time of day pricing. Furthermore, many operators have to absorb the charges themselves without passing them onto their customers. This is generally because many operators agree contracts for transport services based on distance travelled as opposed to time of day and tolls; and in urban areas it is common for multiple customers to be served in the same trip, which dilutes the overall financial impact of the charge. Therefore, Holguín-Veras et al (2006) recommend that for congestion charging aimed at reducing truck traffic to be successful, it needs to be implemented as part of a wider set of comprehensive policies that also target the receivers of urban freight; since they are responsible for deriving its demand.

3.3.2 Urban freight and the impact on the environment

Urban freight is a significant source of negative environmental impacts, in particular local air and noise pollution that affects not only the quality of life, but also causes negative health implications for the most vulnerable urban dwellers (Allen and Browne, 2010; Quak and De Koster, 2009).

In the UK, statistics reveal that there are approximately 460,600 registered HGVs and 3.2 million LGVs on Britain's roads, compared to the 28.7 million private cars that are registered (DFT, 2013). However, studies have shown that the movement of goods in HGVs and LGVs accounts for approximately 20% to 30% of urban vehicle-kilometres, and some 16% to 50% of air pollutants emitted by transport (Dablanc, 2007) and that "the significance of urban freight to unsustainable impacts compared to passenger transport is growing" (Lindholm, 2010, p6207). Earlier estimates had reported that despite freight vehicles accounting for only a small proportion of the vehicles in cities (10% to 18%), they are responsible for approximately 40% of the air pollution and noise emissions (European Commission, 2006).

Efforts to address the negative environmental impacts of urban freight transport typically involve the implementation of policy measures and restrictions by local authorities, for which some examples were presented in the previous chapter. For local authorities, these measures are aimed at improving one or more of the economic, social or environmental impacts of urban freight movements (Allen and Browne, 2010). Local authorities have come under increased pressure to meet stringent EU targets on air quality, and since the movement of freight by road is a major contributor to transport emissions (DFT, 2008), they have focused their attention on the emissions from commercial vehicles.

This general drive towards reducing emissions from transport has further led to some areas introducing emissions based policies, as explained in the previous chapter two (section 2.4.4). One example is the creation of a low emissions zone, whereby only vehicles that meet strict emissions criteria are permitted to enter and operate within a particular location. Such policies tend to be implemented in locations where levels of air pollution are significant enough to cause a danger to public health (Allen and Browne, 2010). In 2008, a Low Emission Zone (LEZ) was introduced across a wide area of Greater London to encourage commercial vehicles to become cleaner by penalizing those operators whose vehicles do not meet the minimum required standard. Within this zone is the London Congestion Charge (LCC) area. The LCC is primarily focused on the reduction of congestion, but it is complementary to the LEZ scheme in the sense that electric vehicles are exempt from the congestion charge, providing an additional incentive for freight operators and other road users to adopt electric vehicle technology. Despite being considered as a good way of improving urban air quality, ex-ante research by Browne et al (2005a) suggested that an LEZ causes significantly higher operating costs for freight operators to ensure that vehicles are compliant with the scheme. In addition, LEZ's could potentially mean higher costs for businesses located within the zone due to potentially higher transport costs for delivery and collection of goods.

3.4 Research perspectives on planning for urban freight

In 1984, Ogden investigated the extent to which freight is included in urban transport planning. He concluded that urban transport planning at the time of his investigation tended to be focused on the movement of people into and around urban areas, as opposed to the movement of goods, and that rarely was freight transport included as a key urban stakeholder. He described this as a gap in "urban transport planning and policy deliberations" (Ogden, 1984, p253), from which he suggested various policy and planning interventions that could be implemented to improve urban freight distribution. Examples of these initiatives include: the identification of urban areas which have the

potential for “freight generating land uses” (Ibid, p257); infrastructure design in the future to consider the dimensions of goods vehicles and incorporate maximum vehicle loads; and to make considerations in the area of traffic flow (an example being to use traffic management techniques to influence or control the routes used by freight vehicles in urban areas), which is highly sensitive to public policy intervention (Ogden, 1984).

Eight years later, in support of his earlier findings, Ogden (1992) expanded on the absent freight elements of urban transport policies, and identified three main objectives with regards to freight that these policies should aim to satisfy. The first is economic development, which seeks to reflect the contribution of freight and logistics to the urban economy and overall GDP (Gross Domestic Product). The second objective is transport efficiency, which is the idea that it is the responsibility of the public sector to provide and maintain appropriate infrastructure that facilitates the movement of urban freight. The third of Ogden’s objectives is to minimise the adverse impacts of goods transport through, for instance, the implementation of measures such as access restrictions in an effort to reduce levels of congestion and environmental damage.

An American study of urban freight mobility supports the early views expressed by Ogden (1984). The qualitative research by Morris et al. (1998) recognised the need for government organisations with responsibility for planning and developing transport systems to acquire a greater understanding of the changing requirements of the logistics and transport industry. Through a combination of interviews and focus groups with logistics, transport and distribution managers, whose organisations operate in New York City (USA), Morris et al. (1998) were able to identify the barriers to moving goods into and through city centres, and thereby were also able to extract some of the different strategies adopted by industry to overcome these issues. Some of the major barriers and possible solutions to urban freight mobility that Morris et al. (1998) discuss are: traffic congestion, particularly during peak travel times and the associated parking and loading/unloading issues, which some hauliers addressed by making Saturday deliveries where possible; and physical impediments that hinder the unloading of large shipments, possibly eased by breaking the shipments down into smaller consignments for delivery on multiple vehicles, however this adds more vehicles which contributes towards traffic congestion and pollution.

In 2007, Browne et al. reported on the results of a comparison of freight transport strategies in London and Paris, where up until the early 2000’s policy makers had paid little specific attention to freight transport. From the year 2007, the Mayors of London and Paris began to incorporate freight transport into policy considerations, as part of

their overall transport strategies. The specific policy measures considered for both cities broadly fall into the following categories: loading and unloading, vehicle access, modal shift and encouraging cleaner vehicles (Browne et al, 2007a).

Following six years of fieldwork conducted across a range of European cities including Paris, London and Barcelona, Dablanc (2007) suggests that little has changed with regard to the inclusion of freight in urban transport policy. The research subsequently concluded that “on the whole, local public policies regarding freight are scarce and out-of-date” (Dablanc, 2007, p282), and that few local authorities regard freight movements as a valuable service that they should help to integrate and plan for (Dablanc, 2007).

More recently, Lindholm (2010) analysed the data from four urban freight studies that were conducted in small and medium sized European cities including many Swedish municipalities as well as a number of other northern European cities between 2005 and 2008. A combination of qualitative interviews with local authorities and quantitative surveys of freight activities across a number of Swedish cities lead to the conclusion that local authorities lack awareness and are short of knowledge to deal with freight related transport issues (Lindholm, 2010). This often results in almost nothing being done to help reduce the impacts and improve the efficiency of urban freight in Sweden. A similar perspective is held in the UK at present, where over the last three decades the problems of urban freight have been known but it seems that little has been done to overcome them. It is suggested to be a gap in transport policy, however policy gaps do not exist in isolation, they are created; often as a result of a lack of information or recognition of a problem. It is therefore possible that this lack of awareness and knowledge at a local authority level on how to deal with freight issues (Lindholm, 2010) could be contributing towards the creation of this policy gap. Behrends et al. (2007, p703) suggest one reason for this being that, “freight transport is considered to be a private sector phenomenon on both the supplier and user sides, and it is driven by commercial imperatives”. Consequently, the logistical operations of private firms are not at the forefront of local authority concerns, since they are not well understood nor is there much data available to fill in this gap in knowledge (Crainic et al, 2004). Behrends et al. (2007) highlight the need for local authorities to adopt a more proactive role in the management of urban freight.

In summary, there remains a real and on-going concern amongst researchers that there is a divide between planning for the movement of people and the movement of goods. This could be exacerbated by a lack of understanding at a local level of the needs of urban freight; and if this is true, it could be detrimental to the overall efficiency of the road network and of freight operations. Given the significant role that freight has

in the economy for supporting and sustaining our existing lifestyle, current urban transport policy needs to be examined more closely and the day to day needs of freight operations better understood, in order to improve the effectiveness and efficiency of freight logistics in urban areas.

3.4.1 Identification of urban freight stakeholders

Freight transport in urban areas is complex and there are several stakeholders along the supply chain, all of which have different requirements for and perceptions of freight transport operations. Danielis et al. (2010) explain that urban transport policies impact different distribution channels and different types of goods in a diverse number of ways, which ultimately has an effect on the numerous stakeholders involved. The identification of urban freight stakeholders is therefore an important distinction for local authorities and those involved with transport planning and policy to make, since each group may well have different perceptions, objectives, constraints, and options which all need to be balanced.

Ogden (1992, p4) highlights the enormous “complexity and heterogeneity” of urban freight transport, which has arisen from the wide range of stakeholders and their differing perceptions of the ‘urban freight problem’. As such, it can be a difficult task for local authorities to recognise and identify all the relevant stakeholders and different interest groups within the urban area, in particular those interest groups that only have an indirect effect on transport operations (Ibid). Ogden (1992) categorised participants involved in urban freight under the following headings: shippers, receivers, forwarders, trucking firms, truck drivers, terminal operators, firms involved with modes of transport other than road, road and traffic authorities, and governments. Although more recent studies have considered broader sets of stakeholder categories to be more appropriate, such as those suggested by Stathopolous et al. (2012), which include representatives of freight carriers, local policy makers and retailers. Three main stakeholder groups have been identified by several authors (Mintzberg, 1983; Muñuzuri et al., 2005) that could be responsible for the implementation of different measures: *Carriers/logistics operators* (companies that deliver goods into the urban area, including those making deliveries on their own account), *Receivers* (companies that receive goods delivered by carriers), and *Local authorities* (responsible for implementing regulations). The above mentioned stakeholders are the most obvious stakeholders that directly influence transport operations, although Russo and Comi (2011) add end consumers, inhabitants and visitors to the list of identified stakeholders.

In order to achieve a well grounded and efficient urban goods transport policy, the differing needs of all these stakeholders need to be taken into account. The OECD (2003, p28) identified a number of individual interests of various stakeholder groups

(Table 3-2). With the exception of a shared common interest in the consumption of goods, the individual interests of stakeholders in urban freight often conflict (ibid).

STAKEHOLDER GROUPS	INTERESTS
Residents	Good living climate, minimal hindrance of vehicles and trucks, especially during night hours. Timely availability of goods.
Visitors	Attractiveness, good shopping climate, accessibility and parking space.
Estate managers and developers	Profitability
Retail	Good shopping climate for visitors and customers, profitability.
Shippers, carriers, retail	Accessibility, attractive local working environment adequate infrastructure for transport operations, cost efficiency.
Business	Accessibility and attractiveness.

Table 3-2 Differing interests of urban freight stakeholder groups (OECD, 2003, p28)

Allen and Browne (2010) note that the two main stakeholder groups that are capable of implementing changes to the way urban freight operates are: public policy makers (urban and local authorities) and freight transport operators. Under the direction of national government, local authorities have the autonomy to implement localised policy measures (examples of TDM measures were discussed in chapter two) that necessitate or encourage freight companies to change their operating habits. Whilst freight operators on the other hand use internal mechanisms to instigate changes in their operating behaviour, usually because these changes will induce some internal benefits for the organization, such as financial savings or efficiency gains (ibid).

3.4.2 Involving urban freight stakeholders in policy planning

As the previous section explains, there exists a wide range of urban freight stakeholders with potentially quite different needs and problems. Therefore, it can be difficult to achieve successful participation amongst public and private stakeholders (Allen et al., 2010). In the context of urban freight, the umbrella term 'Freight Quality Partnerships' (FQP) has been used to describe various forms of cooperation between public and private sector stakeholders. Browne et al. (2003) distinguish between two uses for FQP's, the first is more narrow, and is focused on a particular project where

the partnership is used to increase and maintain the involvement of the private sector in a particular project, for which there is mutual interest from all parties. The second type is broader, and involves the establishment of initiatives to facilitate the dissemination of information, communication, and collaboration or cooperation between the public and private sector. It should be noted that partnerships in the narrow sense, generally refer to the sharing of expenses, profit, and losses with a partner organization; whereas the broader type of partnership that refers to the sharing of information and joint working practices is becoming more widely recognised and favoured by government, this is because it ensures that the private sector participates in policy decision making (ibid).

With regards to urban freight, these partnerships may be used for: public infrastructure projects undertaken by the private sector (e.g. road building or maintenance); operational agreements between parties (e.g. delivery time-windows); written consultation on proposals or ideas; or for the two-way dialogue about existing or future policies (Browne et al. 2003). In recent years, governments at national level have begun to encourage the creation of partnerships with the private sector, thus recognising the important role of the private sector in implementing public policy that is to achieve successful outcomes; although the approach adopted for establishing these partnerships differs between countries (Browne et al, 2003; Lindholm and Browne, 2013).

The 1990's witnessed the establishment of a number of freight focused partnerships, particularly in European countries. In the Netherlands, cooperation with the private sector was recognised as an important factor by the government in policy implementation, and in 1995 the Forum for Physical Distribution in Urban Areas (Platform Stedelijke Distributie, known as PSD) policy agenda was introduced. This policy required the involvement of both public and private sector stakeholders in the development of policies to create win-win situations; and stipulates both parties sign a covenant whereby private sectors agree to behave in a particular way and public sectors agree to provide the necessary facilities, finance, or reassess and alter regulations (Browne et al. 2003; Allen and Browne, 2010; Allen et al. 2010; Lindholm and Browne, 2013). Throughout nine years of the PSD operating on a national scale, three process management models for encouraging stakeholders to collaboratively develop solutions to urban freight problems were developed (van Duin, 2006; Allen et al. 2010). Firstly, the Amsterdam model was developed in 1995, which allows all actors involved to determine the best measures to take forward and the municipality decides how to legislate them. Secondly, the Groningen model created in 1999 also lets all actors decide on the measures to be taken and innovation is obtained through

facilitating private city distribution with regional coverage, whilst the municipality decides how to legislate the chosen measures. Finally, the Hague model, developed in 2003 allows all actors to determine the rules, whilst innovation is achieved through integrating different transport modes and functions; and since there is less legislation of the rules and responsibility for implementing is shared amongst the actors involved the municipality assumes the role of the facilitator. The PSD was disbanded in 2004 following a review that found it had achieved insufficient policy outcomes (Visser, 2004; Allen et al. 2010). However, it was replaced with four smaller, regional platforms to facilitate more detailed discussions that focused on providing greater insight into urban goods distribution and the effects of locally implemented policy measures on urban goods distribution (van Duin, 2006).

A similar national forum was launched in Sweden in 1997, known as the Logistikforum, which began as a group of stakeholders brought together to discuss general logistics issues (Lindholm and Browne, 2013). The Logistikforum now constitutes the government's advisory body for logistical issues, and includes a sub-group for dealing with city logistics (Ibid). However, due to a lack of reports detailing the activities of the Logistikforum it is not clear exactly what has been achieved to date, although according to Lindholm (2012) a recent report published by the Swedish Ministry of Industry in 2010 highlights the importance of working together on urban freight transport in order to reach sustainability.

In the UK, Freight Quality Partnerships (FQP's) have been promoted by the government since 1999 and are used to formally engage the public and private sectors with regards to freight transport (Allen et al. 2010; Browne et al. 2010). The government suggests that FQP's "can play a significant role in developing understanding between parties with different apparent self interests and often lead to outcomes that satisfy the needs of all parties. The best FQP's produce tangible benefits through implementing informed decisions" (DFT, 2008). Allen and Browne (2010) explain how FQP's can be used to improve the communication between a range of urban freight stakeholders including: local authorities, freight transport operators, retailers, manufacturers, local residents and other interested parties brought together to address specific freight transport issues. Essentially, the FQP provides a forum for members to exchange information, experiences and initiate freight projects, and can be created to address any type of geographical area, although the majority focuses on urban areas. A survey of 87 FQP's by Allen et al. (2010) determined that 38 focused on an urban area; 36 had a combined urban and rural theme and 13 solely concentrated on rural areas. However, only 58 of the total 87 FQP's surveyed were still meeting (Ibid). In terms of urban freight projects, Allen and Browne (2010) report that FQP's

have achieved a wide range of successful outcomes including: the production of freight specific maps for drivers of goods vehicles; improved road signage; provision of information boards and online portals to provide essential information to goods vehicle drivers; and reviews of parking and loading restrictions and availability of on-street loading / unloading facilities.

A variety of approaches have been adopted for urban freight partnerships, which Lindholm and Browne (2013) point out is largely dependent on the individual circumstances of the region or local area that they feature. The authors also note that in order for a partnership to be credible and effective it must encompass a range of relevant stakeholder participants both from the public and private sector. This confirms earlier work by Hesse (1995) that concluded stakeholder cooperation is an important factor in the success of city logistics projects; and Crainic et al. (2004) who concluded that greater efficiency in urban freight can only be achieved through organizational approaches that involve public-private sector understanding, partnership and collaboration. Therefore, freight partnerships have an important role to play in shaping urban freight policies by providing the opportunity for the private sector to explain the business and operational aspects of urban goods movement (Lindholm and Browne, 2013). However, despite the growth of interest in urban freight amongst policy makers over the last decade, and the establishment of freight partnerships, there remain many unresolved problems and issues. In the UK, until recently, there has been little research focused on determining the effectiveness and achievements of FQP's. It would seem that the most notable achievements centre on sharing and disseminating information about freight issues, as opposed to developing tangible outputs and alternative policy solutions to address the problems discussed (Allen et al, 2010).

3.5 Alternative solutions for urban freight transport

Over the last decade there have been a number of urban freight research projects, of which many have been funded by the European Union. These have focused on investigating the potential for innovative urban freight solutions and examined the social and environmental impacts of logistics activities in urban areas. Some of the projects that have been undertaken in Europe are summarized in Table 3-3 and then discussed in the subsequent paragraphs.

The sections that follow consider in more detail some of these innovative solutions for urban goods distribution, including: underground freight systems, the use of urban canals, tram systems, and urban consolidation centres. It is worth mentioning at this point that many of these solutions that have been implemented in place of, or to support, traditional urban road freight distribution are a result of successful cooperation

between a local authority and private sector business. The key question is therefore how to get such innovative solutions considered in urban areas elsewhere, thus highlighting the importance of involving private sector stakeholders in the decision making process, thus leading towards a joint decision making approach.

EXAMPLES OF URBAN FREIGHT PROJECTS IN EUROPE	
City Freight (2002-2004)	Analysis of socio-economic and environmental impacts of changes in freight transport in a variety of European conurbations. Evaluated selected distribution initiatives in operation and categorised them in a database.
CIVITAS (2002-2013) <i>City Vitality Sustainability</i>	Variety of projects in European cities aimed at implementing sustainable urban transport strategies. Initiatives include clean and energy efficient vehicles, innovative route planning technology and infrastructure projects.
BESTUFS I & II (2005-2007) <i>Best Urban Freight Solutions</i>	Core themes investigated include: Urban consolidation centres and innovative last mile solutions; freight in small and medium sized cities, and urban waste logistics; urban freight in port cities, innovative urban freight solutions and the management of urban freight.
Green Logistics (2006-2010)	Reviewed the economic, social and environmental impacts of logistics activities and freight transport operations in urban areas. Possible solutions to common urban goods distribution problems were also identified.
Smart freight (2008-2010) <i>Transport in urban areas</i>	Assessing the application of information and communication technology (ICT) solutions in urban traffic management to coordinate urban distribution.
SUGAR (2008-2013) <i>Sustainable Urban Goods Logistics Achieved by Regional and Local Policies</i>	Project aimed at promoting the exchange, discussion and transfer of policy experiences, knowledge and good practice to achieve sustainable urban freight policy in EU whilst addressing the problem of inefficient and ineffective management of urban freight distribution.
City Move & City Log (2010-2013)	Complementary projects adopting an integrated, innovative approach to urban freight distribution aimed at increased safety and efficiency of vehicles and reducing CO ₂ emissions.

Table 3-3 Summary of examples of European urban freight projects

The City Freight project was mainly concerned with researching future urban freight requirements and strategies in response to the problems associated with urban road freight (Allen and Browne, 2010). It resulted in the provision of best practice recommendations for interested stakeholders on ways to both analyse their urban freight problems, and on how to solve them through the design and implementation of integrated strategies. Stantchev and Whiteing (2006) summarised a selection of the recommendations from the project including: reduction of noise emissions from off-peak deliveries; consolidated deliveries; using Cargo Tram, bicycle couriers, electric and hybrid electric vehicles, and distribution on foot to combine freight and passenger traffic within cities to reduce the demand for transport; and the integration of land use and transport planning.

The CIVITAS Initiative ('City-Vitality-Sustainability' or 'Cleaner and Better Transport in Cities') included a number of research projects across European cities that aimed to implement new transport measures and policies in an effort to achieve sustainable urban mobility. There have been three phases of the CIVITAS project, the first from 2002 to 2006 that involved nineteen cities in four projects; the second from 2005 to 2009, in which seventeen cities participated in a further four projects; and the third phase that is currently in progress (2008 to 2013), for which twenty-five cities are involved with five collaborative projects (CIVITAS, 2012). Urban freight is just one of eight thematic categories of measures identified as a requirement for sustainable mobility, which has inspired a number of urban freight related projects including utilising urban canals and the Cargohopper road train for zero emissions urban goods distribution.

The BESTUFS projects (I & II) have collected best practice data regarding urban freight transport projects and measures trialled and implemented across Europe (BESTUFS project, 2010). In addition, the projects aimed to widen the existing network of urban freight experts; user groups; transport operators; relevant EC directorates; and national, regional and local authority representatives through the organization of regular conferences and workshops across Europe, and dissemination of reports to draw attention to interesting developments in urban commercial transport (Allen and Browne, 2010). BESTUFS projects covered a wide range of urban freight themes including: improving the design of urban goods vehicles; vehicle access and parking regulations; e-commerce and last-mile solutions; the potential for using non-road modes for urban distribution (e.g. cargo tram); road pricing initiatives; urban consolidation centres; public private partnerships for urban goods movement; night time deliveries; urban waste logistics; and the adoption of ITS for urban goods transport (BESTUFS, 2010; Allen and Browne, 2010).

The UK national project on Green Logistics, funded by the Engineering and Physical Sciences Research Council (EPSRC) has also contributed to a variety of potential 'solutions' to urban freight transport problems. Although work modules within the project covered a diverse range of logistics research topics, a number of outputs from the Green Logistics project are of particular relevance to urban freight. These included, examining the potential for the development of UCC's (Browne, et al, 2005b, 2007b) and the use of smaller commercial vehicles for more effective and sustainable distribution in urban areas (Leonardi et al, 2012); and the innovative concept of an advanced booking and control system for on-street loading bays (McLeod and Cherrett, 2011). Other relevant research projects carried out within the Green Logistics program examined the scope for joint commercial and household waste collections (McLeod et

al, 2011); and ways of improving the sustainability of reverse logistics systems in the charity sector, through understanding the logistics of charity collections and deliveries to shops (Norton and Cherrett, 2011).

Through the development of Information and Communication Technology (ICT) to integrate the management of traffic within an urban network and the management of freight distribution; the Smart Freight project intended to contribute towards improving the efficiency, environmental impact and safety of urban freight operations. There were three main objectives for the project: firstly, “to develop new traffic management measures towards individual freight vehicles through open ICT services, on-board equipment and integrated wireless communication infrastructure”; secondly, to “Improve the interoperability between traffic management and freight distribution systems”; and finally to coordinate all freight vehicles within a city using ICT, on-board equipment and wireless communications (Smart Freight, 2008).

The EU funded SUGAR project (Sustainable Urban Goods Logistics Achieved by Regional and Local Policies) consisted of seventeen partners from ten EU countries, all collaborating to address the problem of inefficient and ineffective management of urban freight distribution, mainly through the transfer of knowledge in order to better coordinate activities. Three main elements form the structure of the project: Identified good practice sites were used to refine policies; policies were developed at transfer sites; and the Enlarged Transfer Programme helped to create interest, knowledge, tools and exchange for new administrations outside the SUGAR partnership (Sugar logistics, 2007).

The most recent EU funded project is City Move (CITY Multi-role Optimized Vehicle). This is a collaborative project between Europe’s leading vehicle manufacturers and key stakeholders. The project aims to develop an adaptable, innovative vehicle concept for delivering goods and services in urban areas that uses the latest technology to offer a clean, reliable and safe, and CO₂ efficient freight transport (Aimo Boot and Burzio, 2010). City Move is complemented by its sister project ‘City Log’ (Sustainability and efficiency of city logistics), that aims to develop an adaptive and integrated mission management tool to be incorporated into innovative vehicle and transport solutions to improve and the sustainability and efficiency of urban freight distribution (Konstantinopoulou , 2010).

3.5.1 Underground solutions

Road freight transport has become synonymous with urban logistics and for the foreseeable future will continue to play a vital role in the transport and distribution of goods in urban areas. However, since the 1990’s there have been various research

projects investigating some potential alternatives. For example, the potential for employing Underground Logistic Systems (ULS's), which use small zero-emission rolling stock vehicles to distribute palletised goods through a network of tunnels to large retailers with a direct connection to the ULS, and to inner-city distribution or courier companies for onward delivery to smaller clients.

The concept of using underground delivery systems for urban freight distribution is not new, and various systems have been in operation in a number of locations around the world since the early part of the twentieth century. Perhaps the most well-known example is 'Mail Rail', a 6.5mile underground mail delivery operation in Central London (Figure 3-4), established in 1927 which, up until its closure in 2003, had in its heyday been responsible for carrying up to 12million items of mail across Britain's capital city every day (Greater London Authority, 2003). An even earlier example is the Chicago Freight Subway, which began operating in around 1914, and is believed to have been the inspiration for London's Mail Rail. This network of underground tunnels had connections to most of the department stores and large businesses in the city centre. At its peak, the freight subway operated around 130 electric locomotives and 3300 freight cars, and in 1914 it handled approximately 550,000 tons of freight, of which nearly half was retail goods (Ward, 1916).



Figure 3-4 London's Mail Rail

(Source: www.thisislondon.co.uk)

More recent interest in ULS's is in response to government policy in the Netherlands that advocates a modal shift for goods from road to rail and waterway. The concept is being considered as a substitute for road transport for time-constrained goods to and from Schipol Airport and the world's largest flower auction at Aalsmeer. The possible introduction of such robotised ULS systems in the Netherlands would help to "secure and improve accessibility of cities and major economic areas for goods transport" whilst improving the quality of urban life by reducing emissions, noise levels and road traffic accidents caused by commercial goods vehicles, and also to strengthen the region's

economy by constructing a competitive transport-system in the area (Gordijn, 2004, p234). However, it was clear that by 2005 the planned implementation of the ULS concept had failed to be realized, after it was put on hold in 2002 (Wiegmans et al, 2010). In the first evaluation since the ULS Schipol project was terminated, Wiegmans et al (2010) investigated some of the reasons behind the project's failure. Aside from the high investment costs and issues over wider inter-modal connectivity to the system from further afield, one of the main reasons why the ULS projects were discontinued was due to a lack of support from key political decision makers. Although it should be noted that reasons behind this lack of political support stem from an unwillingness of the private sector to participate financially in the project (ibid). In hindsight however, Wiegmans et al (2010) point out that the proposed ULS system was technologically ahead of its time with regards to its level of logistics automation, which established freight transport operators at the time would have found difficult to integrate into their logistics supply chain.

Another potential method for goods distribution in urban areas, similar to the ULS concept is currently under development in the historical city of Perugia, Italy. The system, known as 'Pipenet', is designed to transport goods in capsules into the city centre through a network of vacuum-sealed pipes. The network enables parcels of freight to be transported at high speeds using low energy, and in comparison to road freight, it offers the following benefits: higher capacity; higher speeds; lower costs; flexibility and potential for modular extensions; low energy consumption; and reduced environmental impact (Cotana et al. 2008). The main issues with such systems, of course, are the infrastructure costs involved and the challenges of retro-fitting them to existing city centres. It is clear that such systems have a long way to go before they will be ready for widespread implementation.

3.5.2 Innovative mode alternatives to road freight distribution

With the exception of a few locations, urban goods distribution by waterway is rarely a viable alternative to road freight. One such exception is the historic mediaeval city of Utrecht in the Netherlands where the CIVITAS MIMOSA project has incorporated the urban canal system into a wider innovate distribution strategy for urban logistics. This unique solution, referred to as the 'Beer Boat' (see Figure 3-5) navigates the city's waterways to distribute beverages to hotels, restaurants, pubs and bars that are close to the canals (CIVITAS, 2012).



Figure 3-5 The 'Beer Boat' in Utrecht

(Source: CIVITAS, 2012)

The original Beer Boat was a diesel powered vessel, launched in 1996 to service the catering industry situated alongside the canals, which helped to preserve the historical architecture that encases the road network, whilst additionally relieving city centre traffic congestion (TURBLOG, 2011). In 2010, the original diesel boat was replaced by a new zero-emissions vessel that is capable of transporting fresh and frozen products in addition to beverages to local catering establishments, however it has now reached maximum capacity and the introduction of a second vessel is under consideration (CIVITAS, 2012). Since the introduction of the new zero-emissions Beer Boat in early 2010, it has been suggested that emissions from road freight vehicles have decreased, and there was a reported fifty percent increase in the volume of goods carried by the new vessel compared to 2009 (ibid).

Also in Utrecht, in addition to the municipality owned Beer Boat, another urban goods distribution initiative was introduced in 2009 – the Cargohopper (Figure 3-6), which is owned and operated by Hoek Transport (Cargohopper, 2012). The Cargohopper is a solar-powered road train that is used to deliver parcels (it is not equipped for palletized goods) in the inner city districts of Utrecht, and in one day it can complete three round trips equivalent to the work of five to eight delivery vans. Due to the zero-emissions and relatively narrow proportions (1.25m wide), the Cargohopper has the advantage of being allowed by the local authority to operate in the city centre at any time of day and in any location (TURBLOG, 2011). It is not subject to the restrictions of the environmental zone, nor does its presence in the narrow streets cause any physical obstruction that could inconvenience any other traffic (Ibid).



Figure 3-6 The Cargohopper in Utrecht

(Source: TURBLOG, 2011)

According to the Municipality of Utrecht, the Cargohopper saves approximately 122,000km normally covered by delivery vans from the inner-city streets ever year; and annually saves around 24,000litres of diesel thereby reducing annual CO₂ emissions by up to 34 tonnes (TURBLOG, 2011).

Another alternative to road freight for the distribution of goods around urban areas is the use of a tram system. In a select few locations, urban rail freight movements have developed in niche markets where railway systems offer more capacity than the road network, for example in Amsterdam in the Netherlands where there is the potential for using spare capacity on the tram network, particularly during off peak times when there are fewer passenger movements (Huschebeck, 2002). Following a successful pilot project, City Cargo Amsterdam began operating in 2008 between a distribution centre on the outskirts of the city to a centrally located transfer hub. The objective for the cargo tram was to create a more accessible and safer city centre, which is achieved through a reduction in trucks in the city centre, fewer accidents caused by trucks, and lower road maintenance costs due to fewer heavy trucks on the roads (Konstantinopoulou, 2010). However, the Amsterdam cargo tram was abandoned in 2009 due to a lack of public funding to maintain and extend the track (Chiffi, 2012). The use of trams for distributing goods is not new; they were introduced at the beginning of the nineteenth century and again during the 1970's in Dresden, Germany until they no longer offered a viable alternative to road distribution. A cargo tram has since become operational in Dresden (Figure 3-7) again to connect the Volkswagon distribution centre with their manufacturing plant that is close to the city centre (Huschebeck, 2002).



Figure 3-7 Cargo Tram in Dresden

(Source: Huschebeck, 2002)

Whilst some innovative solutions can be seen to exist, as demonstrated by the examples above, they are yet to find widespread adoption. Huschebeck (2002, p18) admits “that trucks together with streets offer flexible, cheap and easy adaptable urban solutions for freight logistics” and therefore it is necessary to evaluate the potential for modal switch to alternatives such as rail or water on a “case by case and city by city” basis. Since many of the examples presented here as alternatives to urban goods delivery by road are either conceptual or very specific to a particular location, together with the continuing trend for road freight to dominate the urban sector in the UK, the attention of this thesis will remain directed towards road freight vehicles.

3.5.3 Urban freight consolidation centres

The use of urban consolidation centre’s (UCC’s) as a possible solution to urban freight problems has become a “recurring theme” in urban freight research; and experiences across Europe provide an opportunity to compare and contrast the potential for more widespread adoption (Browne, 1997, p122). As part of the Green Logistics Project, Browne et al. (2007c) completed a detailed predominately UK literature review of logistics activities in urban areas relating to the economic, social and environmental impacts of freight operations. They highlighted the importance of road freight movements in urban goods distribution and presented a variety of solutions to the problems of distributing urban freight identified by freight operators, most notably the introduction of UCC’s as defined in the previous chapter (section 2.4.5).

The main objective for a UCC is to avoid multiple part-loaded goods vehicles operating in the urban area (city centre, town or specific site such as a construction site or shopping centre). Therefore, by providing a transshipment hub for all incoming urban goods which are then distributed efficiently within the urban area in a consolidated ‘milk-round’, using fewer, better utilized delivery vehicles (Allen et al. 2010). Browne et al. (2005b) determined three types of UCC: Special projects set up for non-retail purposes; single site UCC’s with one landlord; and UCC’s that serve a town or city. All three types of UCC has the potential to offer a range of services from basic

consolidation to a plethora of value-adding activities such as stockholding, labeling and pricing, waste collection and goods return services (ibid). UCC's that have been developed for a special project often service a single site for a given length of time, for example the Heathrow Airport construction consolidation centre used during the creation of the new terminal five. Single site UCC's are usually built as a single development for an airport or shopping centre and can be incorporated into a site during the planning phase (e.g. Meadowhall shopping centre, Sheffield and Heathrow Airport retail UCC), and landlords can enforce their use. The third type that serve either a town or city are often established to serve the specific needs of a geographic areas, for example using a UCC to minimize the impact on a historical centre (e.g. La Rochelle in France) or to reduce the number of deliveries made to a specific retail area (e.g. Broadmead in Bristol).

UCC schemes are a popular option amongst transport planners as they can be used to help alleviate traffic congestion and reduce environmental impacts of freight in urban areas, as well as provide the opportunity to promote 'last mile' delivery using electric or hybrid vehicles (Browne et al, 2011; Allen et al, 2012). However they are less attractive to shippers who are tasked with using them, as ultimately they have to relinquish control of their clients' goods. The review of UCC schemes by Browne et al. (2005b) revealed that they are most common in Western European countries such as Germany, France, Italy, the Netherlands and the UK, although another notable example is the Tenjin distribution scheme, in Fukuoka, Japan that was established in 1978. It was also noted by Browne et al. (2005b, p12-13) that the more successful schemes tended to be those operated by a single commercial enterprise as opposed to "a 'co-operative' of local authorities, transport companies and consignees all of whom tend to have conflicting objectives and financial goals". Therefore further work by Browne et al (2007b) attempted to differentiate the conflicting interests between the different actors involved in a UCC by allocating potential costs and benefits amongst them. The following Table 3-4 illustrates some of these complex trade-offs involved with allocating the potential costs and benefits of a UCC amongst the different actors.

	Costs	Benefits
Supplier	<ul style="list-style-type: none"> · Not a single “door-to-door” operation. 	<ul style="list-style-type: none"> · Less time spent making deliveries in cities, leading to reduced operating costs · Potential to use time savings to generate additional revenue
Transport Provider	<ul style="list-style-type: none"> · Security · Loss of control over timed deliveries/responsibility · Perceived increase in damage through extra handling · Additional handling/delivery charges – could be passed to supplier as “surcharge” 	<ul style="list-style-type: none"> · Routes involving UCCs allow more deliveries per day · Opportunity for night deliveries · Helps counter WTD driver shortage · Greater efficiency as no time spent slow running in town/parking problems etc. · Less slow running = improved fuel usage
Receivers	<ul style="list-style-type: none"> · Additional stage when chasing missing/late deliveries 	<ul style="list-style-type: none"> · Improved delivery reliability · Fewer deliveries/less staff disruption · Ability to call-off orders in parts · Clients able to collect purchases from UCC · Less storage/more selling space · Off-site value-added activities · Improved retailing (street) environment · Continuous waste removal/recycling · Clients avoid travelling to store to collect orders – collect at UCC
Local authority	<ul style="list-style-type: none"> · Cost of policing freight movements 	<ul style="list-style-type: none"> · Potential licensing revenue · Fewer delivery vehicles in zone, leading to cleaner air, less congestion, pedestrian benefits and improved traffic flow · Potential for alternative fuel vehicles
UCC operator	<ul style="list-style-type: none"> · Multitude of IT & paperwork systems to handle but not if UCC is considered final delivery point and operator has own system to cover the “last mile” · Timed deliveries – how to service · Responsibility for identifying losses/damages at intake stage 	<ul style="list-style-type: none"> · Profit-making business

Developer (new retail sites only)	<ul style="list-style-type: none"> · Cost of establishing UCC if condition of planning consent 	<ul style="list-style-type: none"> · A revenue stream, either if managed in-house or additional charge on rent · More rentable space as result of centralised receipt point and less “in-store” storage space · Single UCC makes whole site more attractive with fewer freight vehicle movements
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Table 3-4 Potential costs and benefits for each actor involved with an UCC (Browne et al, 2007b, p55)

The allocation of costs and benefits shown in Table 3.4 indicate the contrast in actor perspectives towards UCC's, which to some extent supports the assumption that UCC schemes lead to increased costs for freight transport operators (Allen et al, 2012). This highlights the importance of sharing costs and benefits equitably between those involved, so as to ensure a UCC's success (Browne et al, 2007b). Another factor that could influence the success of an UCC is the importance of involving all potential actors in the initial discussion and planning phases; since active involvement in the decision making process is likely to achieve greater commitment to a scheme (Ibid). This reinforces the need for more joint decision making and stakeholder involvement in planning decisions, especially where it involves and impacts on private sector companies, as well as local authorities.

3.6 Chapter Summary

Urban freight plays a fundamental role in the provision of goods and services that are necessary to support and sustain urban life. As the proportion of people choosing to reside in urban areas continues to grow, so does the demand for urban logistics; which requires an efficient goods distribution system. Due to the limited availability of viable alternatives, road transport is most often used to distribute goods within towns and cities however, this can lead to problems such as traffic congestion and negative environmental impacts, for which there are no standard or easily applicable solutions. Despite the completion of several large scale research projects such as BESTUFS over the last decade that have investigated the potential for innovative urban freight solutions and examined the social and environmental impacts of logistics activities in urban areas (Allen et al, 2007), these innovative solutions have yet to find widespread adoption.

Transport planning literature has identified local government as a critical player in the field of urban freight transport, both as a proactive facilitator of freight movements and as the arbiter of road space. However, there is a diverse set of stakeholders involved in

urban freight operations, with whom it has become necessary for local authorities to consult during the development of new strategies. Therefore, many countries, particularly in Europe have adopted some form of partnership between the public and private sectors (such as FQP's in the UK) as a way to bring together different stakeholder groups, and tackle the current gaps in local authorities' knowledge of urban freight so that freight becomes a properly integrated part of urban transport planning. However, as Allen et al. (2010) reported in their survey of FQP's in the UK, whilst these partnerships have successfully brought together a variety of stakeholders (mainly local authorities and freight trade associations) and achieved greater awareness of freight issues; there remains in many cases, a general lack of involvement from private sector freight and servicing operators. This is possibly due to the complexity in identifying individual private sector stakeholders, which is perhaps too difficult a task for under resourced local authorities to organise. There was also evidence to suggest that some FQP's are at risk of becoming "talking shops" since some respondents reported a lack of focus and direction, which can lead to few tangible outputs (Allen et al, 2010, p39). As such, the second stage of this research focused on developing facilitated workshops to improve stakeholder engagement in freight transport planning and policy making; that was designed to guide both public and private sector stakeholders through a collaborative decision making process.

The next chapter reviews the role of decision analysis in structuring a problem and assessing the possible impacts of potential alternative solutions. It also presents a review of some decision making frameworks that were reviewed for potential use in a freight stakeholder workshop to address urban transport problems.

4 Chapter Four – Review of Decision Making Frameworks

4.1 Introduction

In chapter two the key objectives for transport policy and the tensions between transport policy solutions for freight and non-freight movements were identified. A selection of TDM measures and policies were also used to illustrate how some of the solutions introduced by local authorities may result in dis-benefits to freight operations despite having a positive impact on the overall transport system. In chapter three, an insight into the main problems associated with urban freight and some potentially innovative solutions to these problems was discussed. However, this presents a problem whereby there are many policy alternatives to select from, each with different outcomes that affect different stakeholder groups. The FQP process that was examined in chapter three was intended to enable local authorities to work through these impacts, but has largely failed to influence local transport policy as they have ended up with stakeholders agreeing only to the lowest common denominator alternatives (such as better provision of information). Therefore a need was identified in the research to develop a format for including both public and private sector urban freight stakeholders in the transport policy decision making process, with a view to generating consensus driven outcomes that can be used to inform future urban transport policies.

According to Jennings and Wattam (1998, p1) “Decision making is an activity that lies at the heart of management”, and as such, there is an established body of literature stemming from management science, strategy and behavioural science. The field of decision making is continually expanding, and numerous frameworks, models and techniques have been developed to facilitate and assist both individual and groups of decision makers. There are also many constraints that limit a decision maker’s ability to select the optimal solution or alternative, and therefore it is also important to understand what processes are involved in reaching a decision (Jennings and Wattam, 1998). Decision analysis therefore has an important role in group decision making, so that ultimately decisions are more effective (Goodwin and Wright, 2009).

This chapter therefore begins with a brief introduction to decision analysis and its role in group decision making. This is immediately followed by a review of five conceptual decision making models proposed by Meyer and Miller (2001) for use in transport policy and planning. The remainder of the chapter considers the potential of a number of decision analysis methods to be incorporated into the design of facilitated workshops used in the second stage of the research. Finally, the chapter concludes with a

summary that considers the applicability of these different approaches to the problem of how to include a range of freight stakeholders in the policy planning and decision making process.

4.2 Overview of the role of decision analysis

The role of decision analysis “involves the decomposition of a decision problem into a set of smaller (and hopefully, easier to handle) problems” (Goodwin and Wright, 2009, p3) that once dealt with can provide “a formal mechanism for integrating the results so that a course of action can be provisionally selected” (Ibid, p3). Keeney (1982, p806) defines decision analysis from a technical perspective as “a philosophy, articulated by a set of logical axioms, and a methodology and collection of systematic procedures, based upon those axioms, for responsibly analyzing the complexities inherent in decision problems.” The axioms or accepted principles of decision analysis indicate that the appeal of alternatives is dependent on the likelihood of possible consequences of each alternative, and the preferences of the decision makers for those consequences (Keeney, 1982). In practical terms therefore, decision analysis axioms provide a sound basis and general approach for including judgments and values in the analysis of decision alternatives (Ibid).

However, over recent years the role of decision analysis has altered, it is no longer regarded as a method for producing optimal solutions to decision problems, instead “Its purpose is to produce insight and promote creativity to help decision makers make better decisions” (Keeney, 1982, p821). This view is echoed by Phillips (1989) cited in Goodwin and Wright (2009, p4) who describes the evolution of decision analysis “from a somewhat abstract mathematical discipline, which when applied was used to help individual decision-makers arrive at optimal decisions, to a framework for thinking that enables different perspectives on a problem to be brought together with the result that new intuitions and higher-level perspectives are generated.”

Goodwin and Wright (2009) explain that decision analysis can be particularly beneficial for a group of decision makers compiled of individuals who are experts from different fields, because it brings about enhanced communication and a better understanding of each other’s position. This helps a group to develop an increased awareness of the issues involved and the root causes of any conflicts. It is therefore more likely that commitment to the chosen course of action can be achieved through the use of decision analysis, since it enables stakeholders with different objectives to work together in the decision process and develop a shared view of the issues or problem (Ibid).

According to Keeney (1982) a systematic decision analysis is focused on five main aspects of decision problems, which are:

- 1) The perceived need to accomplish objectives.
- 2) The selection of one alternative from a set of several.
- 3) Associated consequences differ between each alternative.
- 4) There is usually an element of uncertainty about the consequences of each alternative.
- 5) Possible consequences are not of equal value.

The method behind decision analysis provides a framework which combines traditional analysis techniques from operations research, management science and systems analysis with professional judgments and values that together support decision making. Keeney (1982) describes a four step process to decision analysis that consists of: structuring the decision problem; assessment of the possible impacts of each alternative; determining decision makers' preferences; and evaluating and comparing the alternatives.

Figure 4-1 shows how these four steps link together. Iteration occurs throughout the step process and preliminary results from step one can influence the steps that follow.

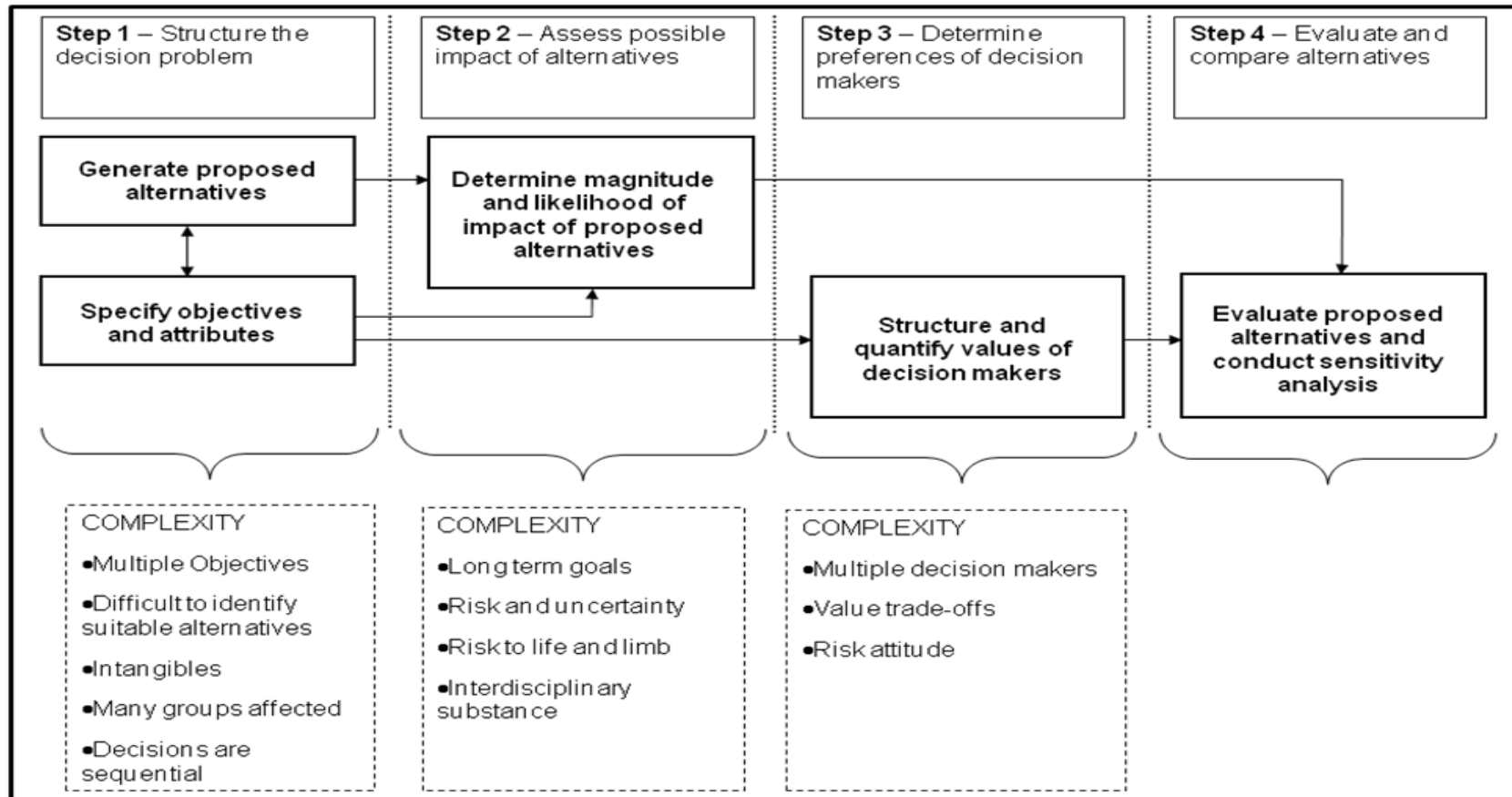


Figure 4-1 Decision analysis process (Keeney, 1982)

4.3 Five conceptual models of decision making in transport planning

Meyer and Miller (2001) discuss five conceptual decision making models derived from the principles and concepts of political science and management science that are relevant to transport planning. Table 4-1 presents a summary and comparison of the five conceptual decision-making models, which include the rational actor approach; satisficing approach; incremental approach; and political bargaining (Meyer and Miller, 2001) that will be discussed in the proceeding sections. It is important to note that decision making is a dynamic process that should not become rigid over time, so that in different circumstances in the same city alternative perspectives on decision making approaches may be appropriate (Ibid).

Models of Decision Making	RATIONAL ACTOR	SATISFICING	INCREMENTAL	ORGANIZATIONAL PROCESS	POLITICAL BARGAINING
Decision-making behaviour assumed	Alternatives are selected to attain some set of pre-determined goals and objectives in a utility-maximising manner.	The first alternative that meets the minimum acceptable level is selected.	Decision making is aimed at moving away from problems rather than towards achieving objectives. Decisions are made based on marginal differences in their consequences.	Decisions are highly influenced by organizational structures, communication channels, and standard operating procedures (SOPs).	A pluralistic decision process, characterized by conflicts and bargaining.
Characteristics of the decision-making process assumed	Decision makers consider all relevant alternatives and acquire a comprehensive knowledge of the impacts of each prior to making a decision. Evaluation criteria are used to accurately differentiate amongst the considered choices. Alternatives are ranked and the 'optimal' alternative be selected.	It is not possible to generate and compare all feasible alternatives, instead they are sequentially discovered. The decision making is adaptive and concerned with achieving goals; and the availability of resources and ability to acquire and process information constrains the rational decision.	A limited number of alternatives and consequences are identifiable hence reducing the number that can be considered. Decision makers have limited coordination and communication; they tend to focus on policies that differ marginally from the existing ones. Instead of highlighting a correct solution the process offers a continual series of responses to problems, which are constantly re-	The output of organizations is government action, and organizational goals are important in the selection process as members bargain to satisfy own goals. Operating routines define the range of available alternatives that have been initially proposed by organisational units based on their individual perceptions of problems. Selected polices are	Conflict and the need to bargain is created as a result of the large number of actors involved in the decision making each with differing goals, values and interests. Decision outcomes are a reflection of the aspects of a problem for which decision makers can agree. Problems or issues of a controversial nature are often ignored or postponed for a future discussion.

			defined to fit solutions. Actions seek to address present problems not future objectives.	only a success when the units who chose them are able to carry out the policy.	
Implications for the planning process	A highly structured and data rich planning process consists of: identifying all feasible alternatives; comparison according to evaluation criteria; ranking of alternatives according to defined goals; and selection of the 'optimal' alternative.	Potential impacts of each alternative provide important information despite evaluative criteria being limited to those relevant to decision makers. For planners to develop a set of feasible alternatives they need to identify and employ defined acceptable levels of policy performance.	Planners are required to define alternatives that differ marginally from existing policies to provide the decision makers with information regarding marginal differences. Little information is needed on the impacts of other alternatives.	The analysis needs to incorporate specific information derived from the goals and objectives of the organisations involved. The limits of implementation are important to both planners and decision makers when proposing and choosing among alternative projects or programs.	Planners should have a broader role. There needs to be a flexible analysis capable of responding to information needs related to alternatives arising from negotiation. Likely issues from competing interests should be anticipated and evaluation results must include as much information as possible to clarify these issues.

Table 4-1 Five conceptual decision making models (Meyer and Miller, 2001)

4.3.1 Rational Actor

The first of the five models is 'The Rational Actor Approach', which assumes a set of rational, informed decision makers whose decision process is based upon maximizing fulfillment of a set of goals and objectives. Although there is little evidence in support of using such a rational model as a descriptive tool, there may still be mileage in it as a means for formulating an analysis framework and for coercing rationality into the political process (Meyer and Miller, 2001). This model is the most structured and data-intensive of all the five models discussed by Meyer and Miller (2001). It requires a structured planning process to ensure all feasible alternatives are identified and then compared against a set of pre-determined evaluation criteria, where they are ranked in order of preference with respect to the goals and objectives (Ibid). Analysis techniques would need to be developed in order to estimate each of the likely impacts. Marsden et al. (2012) examine the role of the rational actor approach in policy learning and transfer, and explain that "structures of formal governance (such as the European Union and its constituent member states, or the US Federal and State Administrations) create mechanisms for coercive transfer of policies" (p906) which thereby ensures a government agent leads the policy formulation process.

Meyer and Miller (2001) provide the example of the environmental assessment process established in the USA that adopted the rational actor approach to decision making. Despite being a rather participatory approach that is subject to public input, the final deciding vote of the preferred alternatives rests with the state governor. Supporting documents examine the environmental consequences of each alternative and identify possible mitigation strategies. The governor who is the 'rational actor' then makes a selection based on the information provided about each possible alternative (Ibid). This approach to decision making is likely to be informed by the results of a cost-benefit analysis (CBA). Damart and Roy (2009, p201) explain that "CBA has influenced most budgeting practices based on the idea that rationalising expenses in order to reach previously defined objectives is possible". As such, CBA can be used by public decision makers to evaluate potential investments for public resources so that only the most profitable projects from the perspective of the wider community receive investment (Ibid). The CBA technique is explained in more detail in section 4.4.4, together with an overview of its benefits and limitations relative to transport policy decision making.

4.3.2 Satisficing Approach

The 'Satisficing Approach' is the second model described by Meyer and Miller (2001), it requires decision makers to choose alternatives that satisfy a determined minimum level of acceptability or that are least harmful whilst conveying some benefit. In 1955,

Simon criticised the rational actor approach on the grounds that it was not possible to generate a complete list of all possible alternatives together with all their possible consequences. Therefore he suggested that decision makers settle for a satisfactory solution that suffices for the time being as opposed to pursuing the optimal solution that the rational actor approach claims to produce (Hicks, 1991; Marsden et al, 2012).

Despite rationality being limited by the resources and the ability of the decision maker to acquire and process information, the satisficing approach is still based on a rational choice (Meyer and Miller, 2001). Meyer and Miller (2001) refer to Simon (1957), and March and Simon (1958) who state four key characteristics of the satisficing model: the search process sequentially uncovers alternatives and consequences of actions; each action is restricted to dealing with a set of situations and consequences; decision making is goal oriented and adaptive; and decision makers refine a set of actions to implement in recurrent situations.

Transport planning that identifies acceptable levels of performance that are used to develop a feasible set of alternatives is perhaps the most supportive of the satisficing approach to decision making (Meyer and Miller, 2001). An example being the consideration of the Copenhagen Metro, Leeds Supertram and the Edinburgh tram, where research by Marsden et al. (2012) revealed that preferred solutions were identified through a process of assessing alternative policies which in some cases was “strongly steered by preconceived notions of the preferred outcomes” (p911). Thereby only a select number is considered during the planning process, as they need to satisfy a number of factors such a policy objectives, political circumstances, and available funds, with the final decision being taken from a select few alternatives based on few consequences associated with each (Marsden et al, 2012; Meyer and Miller, 2001). Usually, the first alternative to satisfy the required factors and survive public consultation is the one that will be selected, regardless of whether or not it is the optimal solution (Meyer and Miller, 2001).

4.3.3 Incremental Approach

Decision making made on the basis of marginal or incremental differences in their consequences is referred to as the ‘Incremental Approach’. Meyer and Miller (2001) explain how it differs from the rational approach by presenting a limited number of alternatives to consider and a limited estimation of their consequences. Thereby decision making becomes an incremental learning process which “appears to be heuristic (guided trial and error, based on past experience) and stochastic rather than rational” (Hicks, 1991, p29); that endeavours to solve problems as opposed to pro-actively seeking to satisfy community goals (Meyer and Miller, 2001). In addition it assumes limited coordination and communication amongst key decision makers (Ibid).

According to Meyer and Miller (2001), the characteristics of the incremental approach to decision making are: the focus on policies that differ incrementally from existing policies, as opposed to attempting a comprehensive survey and evaluation of alternatives; that only a few policy alternatives are considered; and that the evaluation of consequences for each policy alternative is restricted to the most important ones. Furthermore, by continually redefining the problem it is made more manageable; and instead of reaching a single decision or solution, a continual series of solutions is created through serial analyses and evaluation (Ibid). In addition, Lindblom (1968) describes incremental decision making as remedial, and suited to easing current, social imperfections rather than promoting future social goals.

Meyer and Miller (2001) provide an example of incremental decision making in transport, where it may be used to address the issue of increased traffic congestion on an urban corridor. In the first instance, transport demand management measures and policies such as parking and stopping restrictions may be applied to regulate traffic flow. This could be followed by the introduction of exclusive bus lanes the following year that may eventually be replaced by a rail facility when demand rises to a level that will justify the investment. This approach of phased policy implementation demonstrates the tendency of decision makers to initially solve existing problems by implementing policies that take incremental steps from those already in place (Ibid).

This incremental decision making approach gives rise to concern over the role of planning in government departments; since decisions are often made with limited information, time and expertise; and that the problem definition varies between levels of government, and alternative solutions only deviating slightly from existing policies and programs (Meyer and Miller, 2001). Therefore, planning within the incremental approach is mainly concerned with defining alternatives that differ slightly from the current policy and then to provide an overview of the slight differences between them (Ibid).

4.3.4 Organizational Process Approach

The 'Organizational Process Approach' is the fourth model presented by Meyer and Miller (2001). It recognises that often decision making is influenced by the formal and informal structures of an organisation, channels of communication and standard operating procedures. Meyer and Miller (2001, pp63-64) cite three areas highlighted by Allison and Zelikow (1999) where this can be seen: Firstly, government actions are "the output of organisations, decisions made by government leaders trigger organisational routines that guide implementation". Secondly, the "range of effective choice" is often guided by organisational routines that are open to government leaders, with "the alternatives considered by decision makers often originating from agencies or

organisational units whose own perception of the scope and severity of the problem heavily influences the alternatives presented to decision makers". Lastly, policies and programs are only successful to the extent of the capabilities of the organisation responsible for implementing them.

Meyer and Miller (2001) point out that the organizational process approach is well suited to transport decision making due to the strict operating procedures involved in implementing a new transportation project. A good example of this is the construction of new highways that must fulfill design standards of lane width, clearance, sight distance and geometrics (Ibid). Therefore the role of transport planning under the organisational process approach is to ensure that decision makers are equipped with sufficient information on the possible alternatives, including an adequate understanding of the capabilities, skills and resources of the organisations responsible for implementation (Meyer and Miller, 2001).

4.3.5 Political Bargaining

Decision making with the 'Political Bargaining' approach, the final model presented, is acutely aware that when large numbers of stakeholders are involved in a decision they will often have diverse goals, values, and interests, which create conflict and hence the need for political bargaining (Meyer and Miller, 2001). The main difference between political bargaining and the rational actor approach is that the resulting decision may not be the optimal solution, instead it is often a compromise (Ibid).

Spörer-Wagner and Marcinkowski (2010) describe the characteristics of political bargaining based on their review of governance and traditional bargaining literature. The authors cite Lijphart (1999) who explains that the approach is typically found in modern consensus democracies (such as Belgium and Switzerland) whose political system comprises of multi-party coalition cabinets that allow for broad compromises, as opposed to majoritarian democracies like the UK where intense party competition prevails. However, it is perhaps worth noting that in many Western democracies, despite engaging in political bargaining frequently, there remains a reliance on political parties to compete in order to solve a problem (Ibid), and hence political problem-solving is largely reliant on majority decision-making. As such, they cannot be classified as either consensus or as majoritarian democracies (Ibid). Spörer-Wagner and Marcinkowski (2010, p7) maintain that a "certain degree of mutual trust between negotiators is required to achieve political compromises"; however a strategically ushered threat or promise can influence another actors negotiation strategy, or transfer attention for particular issues to parties not involved in the bargaining process. Therefore, an actor's bargaining power is reflected in the degree to which a threat or promise is believable (Ibid). In addition, the quality of discussion during the political

bargaining process is often influenced by the format of the negotiations, for instance private political negotiations (away from public and media attention) are expected to maintain mutual trust and to enable compromises to be reached (Meade and Stasavage, 2006 cited by Spörer-Wagner and Marcinkowski, 2010).

In a discussion of motivators for new transport policies, Marsden et al. (2011) explain that whilst local authority officers are responsible for initiating the majority of new transport policies, directly elected politicians also put forward policy ideas for consideration by national government. An example of this approach in transport policy making was the decision to impose the Stockholm Congestion Charge for a six-month trial, which was a result of negotiations relating to the formation of a national coalition government (Ibid). As this example demonstrates, it is likely that the ultimate decision to result from a political bargaining approach may not be the most 'technically optimal', but instead represents a compromise that has been agreed upon by all relevant actors in the decision. The more controversial aspects of the decision in this case are likely to be ignored or set aside for a future discussion (Meyer and Miller, 2001).

The main critique of this approach however is that the bargaining element could lead to a stalemate, as officials involved in the negotiations represent stakeholder interests, compromising amongst the diverse range of interests may be too difficult (Czada, 1997 cited in Spörer-Wagner and Marcinkowski, 2010). In order for a satisfactory compromise to be reached, officials involved ideally need to dissociate from their target interest groups (Ibid), which also reinforces the requirement for privacy from the media during political negotiation processes, allowing for "collective decisions" to be communicated to the public "without indicating any winner or loser" (Marcinkowski, 2005, 2007 cited in Spörer-Wagner and Marcinkowski, 2010, p10). Conversely, it is argued that bargaining towards some kind of consensus is necessary for realising the objectives of most political leaders, which given the existing government structures in the western world, makes this approach to decision making effective (Spörer-Wagner and Marcinkowski, 2010).

4.4 Methods in decision analysis

There are a number of tools and techniques that can be used to evaluate a range of options and their ability to meet pre-defined objectives. The following sections review a small selection of approaches that can be used by decision makers to aid their assessment and selection of options, and inform policy decision making. These include: cost benefit analysis; trade off analysis; decision conferencing; positional analysis, and deliberative methods. The purpose of this review is to assess the suitability of the current approaches used in policy and management decision making

for potential adaptation and incorporation into freight stakeholder workshops for use in the second stage of the research, to address the fourth research aim.

4.4.1 Cost-Benefit Analysis

Cost Benefit Analysis (CBA) is a technique used by decision makers to help inform the policy process (Hahn and Tetlock, 2005). The technique has its origins in nineteenth century France where it was used to evaluate large development projects like the construction of dams, from a societal point of view (Söderbaum, 2003 and Moberg, 1999). Since its creation, CBA has developed into a widely applied decision support tool that is derived from neo-classical economics for evaluating the potential socio-economic impact of investment decisions (Damart and Roy, 2009). An example would be estimation of the total impact of a project on society by calculating its social costs and benefits. This would include both monetary future costs and benefits, and also monetized estimates of external economic impacts such as environmental impacts, all discounted to identify a net present value (Moberg, 1999, and Söderbaum, 2003). CBA has been adapted for use in a wide variety of decision making scenarios, although it has become particularly synonymous with decision making in the transport sector, where it is one of the most common forms of transport project appraisal used in EU member states (Bristow and Nellthorp, 2000).

Moberg (1999) explains how CBA evaluates the expected impacts of a policy option in monetary terms, based on the economic theory surrounding society's willingness to pay for something or their willingness to accept compensation. In other words, the willingness of those set to potentially benefit as a result of an option being chosen, and the willingness of potential losers to accept compensation for the losses they will incur as a result of an option being selected. Desirable projects or policy options are those whose benefits exceed the losses, suitably discounted over time (DETR, 2000).

4.4.1.1 How to perform a CBA

Moberg (1999) describes an eight step process for performing a CBA:

- 1) Identification of the problem and alternative solutions.
- 2) Identification of social costs and benefits of each alternative.
- 3) Monetary valuation of costs and benefits.
- 4) Allocation of the costs and benefits over the project time.
- 5) Calculate the net present value (NPV) by deciding on a discount rate to define the present value of future costs and benefits.
- 6) Rank the alternative solutions in order of NPV.

- 7) Perform a sensitivity analysis to test the robustness of the alternatives.
- 8) Present recommended alternatives.

4.4.1.2 Advantages and disadvantages of using CBA

As a tool for guiding public policy, CBA has a number of advantages, particularly for society, for whom it considers the potential gains and losses. CBA can be effective when the objective is to maximise economic efficiency (Brown et al., 2001), since it includes an analysis of both internal and external costs are presented in an easily comparable manner, using money as a common denominator (Moberg, 1999, and Soderbaum, 2003). Since the relative importance of different impacts of a policy, based on people's preferences is generally valued in monetary terms, it is easy to determine how worthwhile an option is compared to doing nothing (DETR, 2000). The result of a CBA is therefore a single policy or beneficiary project with the highest valued benefits exceeding the costs (Mober, 1999).

However, as a method for decision analysis, CBA is occasionally criticised on political or philosophical grounds, because it is the government's responsibility to apply such judgments that do not necessarily reflect people's current preferences (DETR, 2000). Although in practice, governments commonly apply political judgment into CBA valuations to reflect social preferences on a national scale, beyond the immediate interests of individual members of society (Ibid). Another limitation of CBA is that it may not always be practical to establish monetary values for some of the non-market impacts, since data required may not be readily available, or it may be too expensive to collect (DETR, 2000). For instance, it can be difficult to ascertain a market value for non-economic variables such as noise, air pollution, accidents and visual intrusion can cause problems for the valuation process (Tudela et al, 2006). Finally, CBA does not generally take into account the interactions between different impacts, for example, people may have strong negative feelings about an option that imposes both environmental and social costs than would be estimated by adding separate valuations of the two effects (Moberg, 1999, and DETR, 2000). Therefore, other multi-criteria analysis techniques are able to provide more flexibility than CBA, and are more comprehensive in their coverage of likely impacts (Ibid).

4.4.2 Trade off Analysis

Webster (2011) explains that a trade-off is where one quantity or aspect of something is lost in return for gaining another aspect or quality. Thereby a trade-off analysis can be defined as determining the effect of decreasing one or more key factors and simultaneously increasing one or more other key factors in a decision, design or project. Often trade-offs are conducted between different aspects and units, such as

travel time in hours and monetary cost in currency (Bai and Labi, 2009). Trade-off analysis can help decision makers to quickly envisage the potential consequences of each alternative decision and finally make a choice (Ibid)

A systematic approach to balancing the trade-offs between time, cost and performance of whichever factor is of interest requires information from costing scheduling, project review reports, and the original plan (Dynamic Solutions Associates, 2004). This information can then be fed into the six step approach (illustrated in Figure 4-2) to completing a trade-off analysis:

- 1) Recognising and understanding the basis for project conflicts
- 2) Reviewing the project objectives
- 3) Analysing the project environment and status
- 4) Identifying the alternative courses of action
- 5) Analysing and selecting the best alternative
- 6) Revising the project plan

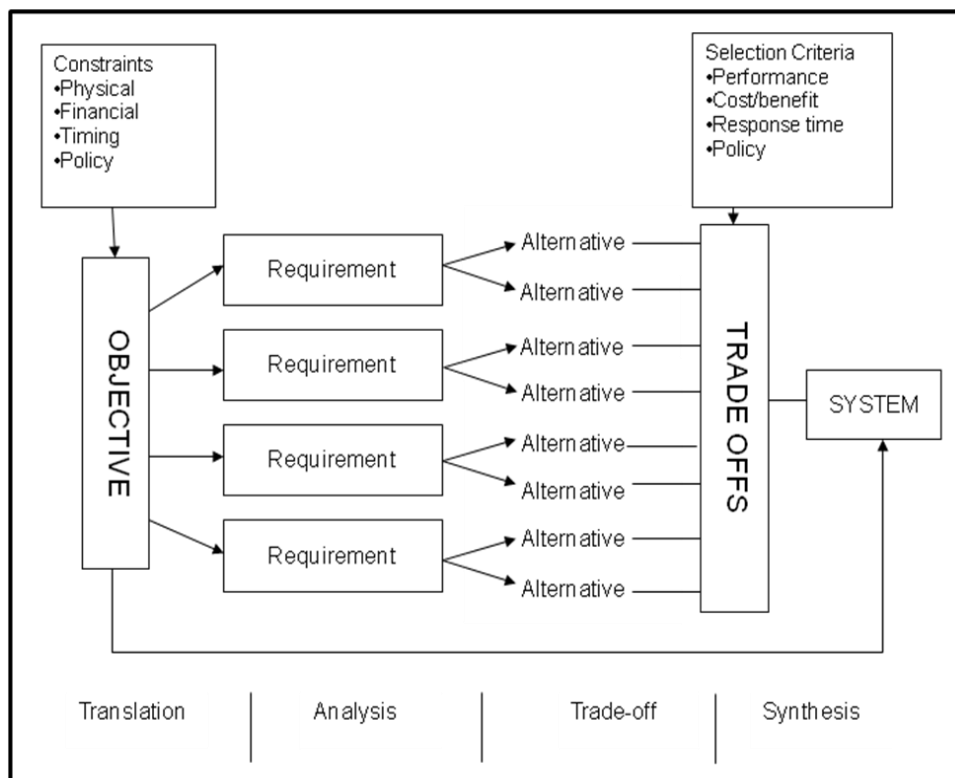


Figure 4-2 Conducting a trade-off analysis (Dynamic Solutions Associates, 2004)

According to Wanyama and Far (2005) a trade off problem arises from a complex decision making process that involves a set of conflicting selection objectives that are

incomparable and fail to point towards a dominant solution. Such situations may occur when selecting development policy; choosing software products; or during procurement of commodities, hence decision makers tend to rely on a computer based system to assess the alternatives. The authors present a trade-off analysis model based on the principles of qualitative reasoning, which is not limited to a certain number of selection objectives or evaluation criteria; it specifies whether a trade-off criterion optimizes or compromises a particular selection objective (Ibid).

4.4.2.1 Advantages and disadvantages of trade off analysis

Trade off analysis is particularly useful for assessing multiple solutions in order “to determine the ability of each solution to satisfy multiple selection objectives that reflect the needs and preferences of the decision maker” (Wanyama and Far, 2005, p99). In addition, trade off analysis has an important role to play in group choice decision making as it identifies the criteria to be optimised and compromised during negotiations between stakeholders (Wanyama & Far, 2007). This is particularly important when a group consists of a number of stakeholders who all have different individual concerns, preferences and constraints (Ibid).

However, according to Wanyama and Far (2005, 2007) most trade off analysis models struggle to satisfy user’s needs. Reasons for these inadequacies include: a clear identification of the trade off criteria and effects on selection objectives is absent; some trade off models are limited in the number of selection objectives and, or solution evaluating criteria they can process; and many models require specified values for each alternative solution which is difficult to provide due to the incomplete and uncertain nature of user preference models that do not establish themselves until the latter stages of the evaluation process.

4.4.3 Decision Conferences

Decision conferences are facilitated working meetings that can be used to solve a variety of problems including conflict resolution amongst experts, negotiation of multi-party agreements, and in the development of government policy (Schuman and Rohrbaugh, 1991). However, the widest application of decision conferencing is in organisational planning for which Schuman and Rohrbaugh (1991) mention there have been various uses ranging from defining organisational goals and priorities and allocating budgets, to the establishment of long-term strategic plans; and evaluating practical issues such as allocating office space and site location selection.

The decision conferencing method enables a small group of key stakeholders and subject matter experts to resolve important issues in their organisation by working together under the guidance of an impartial facilitator to create a decision analysis

model of participants' perspectives on the issues discussed (Phillips, 2006; Innovative decisions, 2011). A distinguishing feature of a decision conference is that the discussion revolves around a computer based model, which allows the participants to constructively debate issues and represent the collective judgments of the group in a logically consistent and easily communicative fashion (McCartt and Rohrbaugh, 1989; Innovative decisions, 2011). Although, Phillips (2006) notes that the main purpose of this computer-based model is to serve as a tool for thinking, and not to provide the optimal solution.

A typical decision conference lasts for a period of two to three days in a meeting room away from daily interruptions, which is followed up with further analysis and reporting (Innovative decisions, 2011; Phillips, 2006; McCartt and Rohrbaugh, 1989). Each decision conference session is moderated and controlled by external facilitators, who are responsible for eliciting information and asking questions; channeling responses; and building analytical models based on responses from the group (Innovative decisions, 2011). According to Schuman and Rohrbaugh (1991) the combination of interpersonal communication and computer assisted techniques successfully incorporates the role of human judgment into the decision making process, whilst allowing participants to use information more consistently and coherently.

Phillips (2006) outlines a five stage process to conducting a decision conference (see Figure 4-3), of which two stages occur prior to the commencement of a decision conference, and one stage follows its completion. These five stages are:

- 1) Initial inquiry from an organisation recognising a gap between desired and actual performance, a recognition that the environment calls for new ways of operating or that current policy or strategy is becoming less relevant to new conditions. The establishment of a motivation for change is also helpful to improve the commitment to implement results.
- 2) A short meeting prior to the event for the facilitator and decision maker to explore the nature of issues, their compatibility with decision conferencing, and to establish a set of objectives. The key players to be included in the decision conference also need to be identified, and should include those people whose perspectives are likely to make useful contributions towards resolving the issues raised.
- 3) The decision conference opens with a discussion of the pre-determined objectives and the opportunity for the participants to modify them before they are agreed and taken forward.

- 4) The issues are discussed amongst the participants, who build up a gradual model of the problem and determine possible results and or solutions to be explored.
- 5) Following the completion of a decision conference, the facilitator compiles a report of the meeting outcomes and a short follow-up meeting is arranged to resolve any remaining issues.

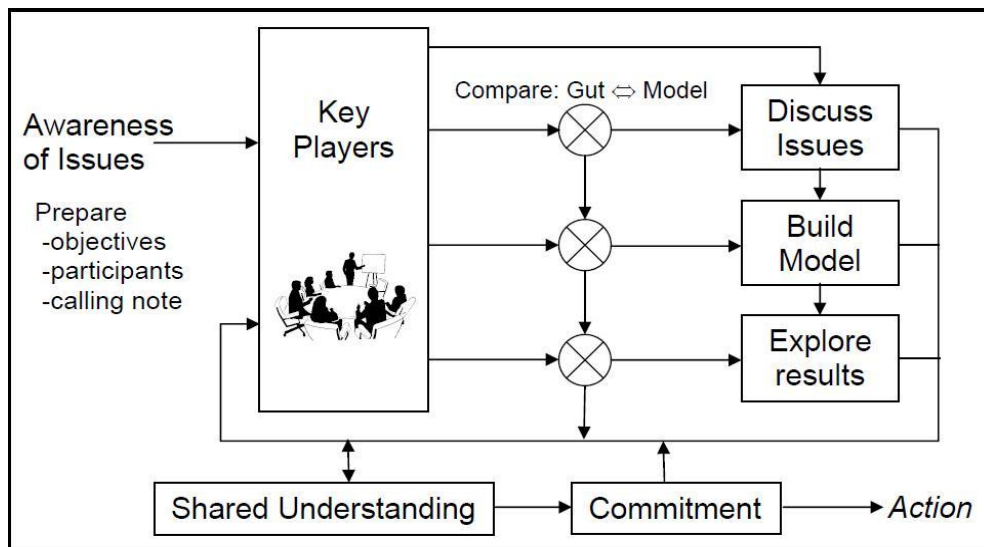


Figure 4-3 The decision conference process (Phillips, 2006, p11)

Decision conferencing results in the development of a shared understanding of the issues amongst participants and the generation of a sense of purpose and commitment to the way forward (Phillips, 2006). Furthermore, Schuman and Rohrbaugh (1991) highlight that for groups that need to reach consensus on a complex, unstructured problem; decision conferences provide an ideal arena for combining the perspectives of a diverse range of people to develop a mutual understanding and ultimately reach a consensus decision.

4.4.3.1 Advantages and disadvantages of decision conferences

Since their conception in 1979, decision conferences have become established as one possible method of creating a forum for constructive engagement within a focused unconstrained conversation (Phillips, 2006). As such, they provide an effective way of improving communication across disparate parts of an organisation; stimulating creative thinking and fostering collaborative working (Ibid). In general, the most effective decision conferences are those based on 'hot' topics or issues of real concern to the organisation involved, which can be either strategic or operational in nature. Although McCart and Rohrbaugh (1989) assert that for a decision conference to result in a successful outcome, an action plan for the duration of the conference needs to be

in place along with the expectation that the target problem will be resolved by the end of the conference.

Phillips (2006) identified three key values associated with decision conferences. Firstly, to assist a group of decision makers to generate shared understanding of the issues, without the need for consensus of opinion on each. Secondly, to develop a shared sense of purpose whilst also accepting differences in individual perspectives; and finally to gain commitment to the way forward, whilst preserving individual paths. In addition, senior managers who employed the decision conferencing technique in their organisation reported that despite participants disagreeing over the best decision the process had helped to achieve agreement about the way forward (Ibid).

Despite being a successful strategy formulation process that combines formal analytical thinking with the behavioral aspects of management, Schuman and Rohrbaugh (1991) note that decision conferencing is an expensive process to carry out. It is costly in terms of the amount of management time devoted to a 2-3 day working group, and in the information system required to support the group's discussions (Ibid). Phillips (2006, p6) also highlights that "decision conferences don't work very well for issues that are merely 'interesting,' or 'nice to consider,' but lacking any sense of urgency for their resolution". Also, if participants feel little pressure to reach consensus or devote too much time to developing the computer-based model a decision conference is likely to fail to achieve sufficient support and commitment to the implementation of the outcomes (McCartt and Rohrbaugh, 1989). Another potential disadvantage is the need for a specially trained facilitator to help ensure a reasonable level of impartiality remains throughout the conference and to avoid them assuming the role of group leader, and actively assisting the group (Ibid).

They are common in the public sector where for instance it has been effectively used by the Bank of England to look for ways to reduce its operational costs by relocating its Registrar's Department outside of London (Butterworth, 1989); and by the UK National Radiological Protection Board to develop guidance on relocating the public in the event of a radioactive release (Aumônier & French, 1992).

4.4.4 Positional Analysis

Positional analysis (PA) was presented by Peter Söderbaum in 1973 as one possible approach to public decision making. Central to positional analysis is its ability to be interdisciplinary, which encompasses environmental, economical and social aspects in the analysis. This aims to clarify the decision making process, making conflicts of interest visible so as to openly discuss different valuation standpoints (Moberg, 1999). As a decision analysis method, PA has mainly been used in Scandinavian countries as

an alternative to Cost Benefit Analysis (CBA) (Söderbaum, 1982; Moberg, 1999). Whereas CBA represents a rather closed approach to decision analysis, based on attributing specific monetary values to different effects, resulting in the analyst's ability to highlight the best alternative or solution from the perspective of society; PA treats values as open-ended and all conclusions are conditional on decision maker's beliefs and ideologies (Söderbaum, 1982). Hence, PA is a compatible approach for decision making involving controversial issues as it is more aligned to the ideals of democracy (Söderbaum, 1982, 2003). In the past it has been used in projects that involve higher strategic level decisions, such as in road planning, forestry and energy systems.

4.4.4.1 How to perform a positional analysis

Söderbaum (1982, 1995) presents a comprehensive step process (Table 4-2) to performing a PA, which can be further simplified if required, depending on the nature of the decision situation and its social and institutional context.

COMPONENTS OF POSITIONAL ANALYSIS	EXPLANATION
Description of the decision situation	Description of the historical background and related decisions, and identification of the institutional context, relevant stakeholders and interested parties.
Problem(s) identification	Description of the problem from different stakeholder/actor perspectives.
Design of alternatives and problem formulation	Selection of possible alternatives and identification of related decision situations and policy options.
Systems thinking	Identify systems that will be affected for each alternative solution.
Identification and comparison of impacts	Determine the likely impacts (monetary and non-monetary) of each alternative.
Evaluation of non-monetary irreversible outcomes	Determine likely influences of first-step decisions on future options.
Analysis of activities and interests	Identify activities that will be affected differently depending on the alternative chosen, assume objectives for each activity and construct ranking in order of preference from the perspective of each activity in relation to each alternative.
Analysis of prevailing risks and uncertainties	Formulate possible future scenarios for each alternative.
Summarise decision information	At the level of impacts and activities.
Determine possible valuation standpoints	Describe possible standpoints (valuation and ideological) relevant to the study area.
Prepare conditional conclusions	Relating the expected impacts of each alternative to possible futures and standpoints.

Table 4-2 Steps in performing positional analysis (adapted from Söderbaum, 1982, 1998; Moberg, 1999)

Many variables can be included in PA to describe objectives and effects; however the emphasis is on positions (which describe different non-monetary conditions at a point in time) rather than flows that refer to periods of time (Söderbaum, 1982). Decisions reached through PA are representative of the first step in a step-by-step adjustment process; and a 'positional tree' (similar to the decision trees common in business

management that describe monetary pay-offs) can be used to display possible outcomes or effects, and non-monetary positions at different points in time for alternative ways of dealing with an issue (Ibid). Alternatively, matrix tables can be used to display order of preferences for each possible alternative. Such matrices can be useful in helping politicians and other decision makers to visualise any conflicts between different interests (where an interest is defined by an alternative and its assumed objectives), (Ibid).

4.4.4.2 Advantages and disadvantages of positional analysis

Moberg (1999) identified the following strengths and weaknesses (Table 4-3) of using the PA method:

ADVANTAGES	DISADVANTAGES
Allows decision makers to apply their own ideologies and valuations.	Analyst intensive method that produces many decisions and choices, and vast amounts of material to present following the process.
Method can be adapted easily for use on all kinds of problems.	Risk of some potential impacts being omitted.
PA illuminates conflicting interests amongst stakeholders.	Time consuming and labour intensive for decision-makers.
PA incorporates many sides, which is crucial for democratic decision making.	Maximising many sides of the issues can lead to confusion.
Can be used with both qualitative and quantitative data, for monetary and non-monetary values to give a broad view of the problem and a systematic method of identifying consequences of different alternatives.	Risk of analysis becoming too broad and including too many possible alternative solutions.
Irreversible effects on future decisions are described separately.	PA was initially considered to be very theoretical and difficult to implement, however further development of PA as a decision analysis method is reducing this drawback.

Table 4-3 Advantages and disadvantages of positional analysis (adapted from Moberg, 1999)

4.4.5 Deliberative methods

Traditionally, the term ‘deliberative methods’ is used to describe research that involves small groups of people who are gathered to discuss and debate a given political topic (Söderholm, 2001). This process leads those involved to “develop preferences about complex policy issues through informed discussion” (Ibid, 488). In recent years, deliberative methods have proven particularly useful in the context of public consultation on topics that the general public are unlikely to be fully knowledgeable on, such as climate change and other complex environmental issues, whose discussion outcomes may be used to help formulate and guide general policy recommendations (Marsden and King, 2009; Söderholm, 2001).

4.4.6 Format for conducting deliberative research

Söderholm (2001) explains that deliberative research methods bring together a group of five to fifteen people for a series of in-depth focus group style discussions on a pre-determined topic. Where the subject matter is of a more technical nature, experts are usually invited to attend the second meeting to answer any technical questions that may have arisen during the initial group meeting (Marsden and King, 2009; Söderholm, 2001). The presence of experts helps to develop public opinions on complex issues through a process of being informed, followed by deliberation, reflection, and finally debate (Marsden and King, 2009). The third and final meeting typically involves a recap of the different perspectives followed by the development of policy alternatives and or general policy recommendations, which reflect the values of the public (Söderholm, 2001).

It is important that participants remain engaged throughout the deliberative process, and as such the sessions are usually divided into short sections with group tasks, whilst the expert sessions tend to be organised as short presentations followed by questions and answers (Marsden and King, 2009). Where there are large groups, these are often split into smaller breakout groups for more focused discussions stimulated by scenarios and short group exercises designed to elicit deeper responses to the research questions posed (Marsden and King, 2009).

4.4.7 Advantages and disadvantages of deliberative methods

Söderholm (2001) notes that in comparison with more traditional methods such as voting and opinion polls, discussions in a focus group setting can strengthen the democratic process through motivating more thoughtful consideration of public issues. The discussion and debate also allows individuals to establish values as opposed to conveying preferences, and therefore participants can clarify as a group what is being valued and why (Ibid).

Research by Marsden and King (2009) used deliberative techniques to understand people's travel choices in the context of climate change. The group sessions proved to be successful for building trust between the participants which encouraged individuals to nominate their own ideas for consideration by the group. Furthermore, Marsden and King (2009) concluded that the long timescale between each session allowed time for participants to gain a deeper understanding of the subject and therefore put forward more informed ideas in the meetings that followed.

According to Aldred and Jacobs (2000) and Söderholm (2001) the most common critique of deliberative research methods is that focus groups used are not necessarily representative of a target population and hence they do not produce reliable quantitative findings. However, by using deliberative methods in conjunction with more traditional survey methods, such as interviews this problem can to a certain extent be overcome (Söderholm, 2001). Söderholm (2001, p493) also points out that using deliberative methods "does not in itself guarantee wise or viable decisions", for some of the suggestions may result in "unintended, unforeseen, and undesirable consequences" in terms of efficiency and fairness (Söderholm, 2001, p 493 citing O'Neill and Spash, 2000).

Deliberative studies can be difficult to organise, as in general they are designed to take place over a number of sessions, which can cause difficulties in ensuring the availability of participants at multiple sessions, in addition to the financial costs incurred through venue hire, catering and payment of incentives, which can be challenging on a limited research budget (Marsden and King, 2009). Marsden and King (2009) also point out that these methods can be time consuming at the analysis stage too, especially when group sessions have been recorded for data coding and even more so if individual responses are being traced. However, incorporating questionnaires and interviews into the process can make the capture of individual responses much easier (Ibid).

4.4.8 Deliberative methods in action

Although it would seem that deliberative research methods are often used on environmental and climate change topics (Aldred and Jacobs, 2000; O'Neill and Spash, 2000; Söderholm, 2001; Marsden and King, 2009), they are in fact applicable across a far wider variety of subject matter, including law, health, GM crops, and transport.

Deliberative methods are an effective way of providing policy-makers the opportunity to understand current public opinion on a topic, which leads to the general public indirectly contributing to the development of future policies (Marsden and King, 2009). Furthermore, deliberative methods are particularly effective when used in conjunction

with other research methods, as demonstrated by Marsden and King (2009), who used it alongside interviews and travel diaries rather than as a standalone method.

4.5 Chapter Summary

Decision analysis theory provides support for the design of the process used in stage two of the research, where freight stakeholder representatives from both the public and private sectors are encouraged to collaborate to solve a common problem, regardless of their differing perspectives, with the aim of achieving consensus based decision making. The reviews of the five conceptual models for use in transport decision making have highlighted their suitability for inclusion in a process that enables freight stakeholders to be included in the creation and design of future transport policies. In terms of creating a collaborative decision making environment that incorporates the interests of a variety of stakeholders, the rational actor and incremental approaches provide the least applicable frameworks. The rigid structure of the rational actor model provides little opportunity for stakeholders to be involved in the decision making. Aside from providing the required information to feed into some form of quantitative analysis of the alternatives, such as a CBA, the final decision rests with the rational actor who selects the optimal alternative based on the analysis. The incremental approach also struggles to provide stakeholders with much opportunity to contribute to decision making since the approach is focused on essentially tweaking existing policies rather than proactively seeking and assessing new ideas. The limited coordination and communication between the decision makers that are involved also means that it is unlikely that the incremental approach would benefit from the contributions that a wider group of stakeholders could bring to a discussion.

There is a good degree of compatibility between the organizational process approach and transport decision making (Meyer and Miller, 2001), particularly for decisions that relate to the implementation of a major transport construction project. Despite this, the process does not really facilitate the inclusion of a wider group of stakeholders in the decision making since often the process occurs within an organization such as a government department, where the alternatives are assessed in accordance with a set of standard procedures. As such, the approach lacks suitability for inclusion in a collaborative decision making process involving a wide range of urban freight stakeholders.

Of the five conceptual decision making models put forward by Meyer and Miller (2001), the satisficing approach is perhaps the most favourable in terms of its applicability to the problem of including a greater variety of freight stakeholders in transport decision making. Although this approach is unlikely to lead to the generation of innovative

solutions, it can help a group of stakeholders to reach the best compromised solution through a rational decision making process. Therefore the optimal solution taken forward is one that satisfies a minimum level of acceptability and provides some benefit to all stakeholders involved. Similarly, the political bargaining approach also enables a compromise to be reached despite the conflicting interests and goals of the stakeholders represented.

As a possible approach for bringing together a diverse group of freight stakeholders to contribute to transport policy decision making, political bargaining has the potential to be an effective way for consensus decisions to be reached. This is partly due to the nature of the process encouraging those involved to dissociate from their respective stakeholder interest groups, effectively creating a level playing field for discussions; and partly due to the tendency for controversial issues that could disrupt the process being ignored or avoided thereby providing those involved with the best chance of reaching a consensus based decision.

This chapter has also evaluated a number of different tools and techniques that can be used by decision makers to assess a range of options or solutions, and therefore inform the policy decision making process. The purpose of this review was to assess the suitability of each for potential adaptation and incorporation into freight stakeholder workshops used in the second stage of the research, to address the fourth research aim. Firstly, CBA a form of economic appraisal that is commonly used in transport decision making to assess the social costs and benefits in monetary terms of a proposed project is most effective when the objective is to maximise economic efficiency. However, not all decision making requires the alternatives to be assessed in monetary terms, and therefore other analysis techniques are able to provide more flexibility in terms of assessing non-economic variables. Therefore, CBA is not a suitable tool for use in a qualitative assessment of stakeholders' preferences towards a range of potential alternatives. Similarly, the applicability of a trade-off analysis for assessing the potential impacts of alternative options is also of little use in a qualitative assessment, since trade-offs are generally conducted between different quantitative units such as time and cost. Although, the technique has been adopted for assessment of qualitative criteria by Wanyama and Far (2005) for use in group choice decision making, the authors note that in practice it tends to struggle to satisfy users' needs. For these reasons, neither CBA, nor trade-off analysis will be taken forward and adapted for use in the second stage of the research.

As an approach to decision making, decision conferencing stimulates creative thinking and fosters collaboration that aims to create innovative solutions following constructive

discussions and debating sessions that are supported by a computer based model. However, they are more commonly regarded as a tool for thinking and enabling a process for successful strategy formulation. They are also fairly costly to run compared with other forms of decision analysis tools and frameworks; in terms of management time required for a 2-3 day workshop and the computer based information system to support the group's discussions. Despite the many ways that decision conferences can be used, as suggested by Schuman and Rohrbaugh (1991), none are really applicable for use in the context of a freight policy workshop; and as such decision conferences have not been investigated any further.

Positional analysis however provides a theoretical alternative to CBA that is compatible with both qualitative and quantitative data. It illuminates conflicting interests amongst stakeholders that facilitates democratic decision making and highlights the best alternative from the perspective of society. The method also lends itself to being simplified as required depending on the nature of the situation. As such, the flexibility of PA means that some elements of the process can be adapted, which makes PA applicable to group discussions aimed at achieving consensus amongst a diverse range of freight stakeholders in the second stage of the research.

Despite deliberative methods being used by policy-makers to understand current public opinion on a topic, and help guide and influence general policy recommendations, they are not entirely appropriate for use in freight stakeholder workshops. This is mainly due to the time-consuming nature of the method in terms of facilitating multiple sessions for one group, which would not be feasible within the limited timescales available for the research; and the lack of a paid incentive for people to participate in multiple group sessions is also a limiting factor for decision conferencing. However, it is possible to incorporate elements from both PA and deliberative methods into the group workshops planned for the final stage of data collection.

The conceptual decision making frameworks and the methods in decision analysis that have been reviewed in this chapter have laid the foundations for the design of the facilitated group workshops designed for use in the second stage of the research. As such, the following chapter describes the methodology for the research, and the rationale for the research approach and methods adopted.

5 Chapter Five – Research Methodology

5.1 Introduction

Chapters two through four have discussed the background literature that shaped the research objectives proposed in chapter one. This chapter provides the research methodology through which this thesis was conducted. For some of the issues to be researched, a specific and deep knowledge is required from the stakeholders. Therefore, the use of a qualitative approach allows more suitable and relevant methods to be applied to gather data from different actors, each with different motivations for future policies.

This chapter begins with a discussion on the research philosophy theories relevant to urban freight logistics and transport policy. This is followed by an evaluation of various qualitative research methods including questionnaires, interviews; focus groups; the Delphi technique and group work techniques that were considered for use in this study. The first stage of the research predominantly utilises interviews together with a pre-interview questionnaire; whereas inter-active facilitated group workshops were designed for use in the second stage of the research. A justification for the methods selected at each stage of the research, and the strategies adopted for recruiting participants is also provided. The implementation of each chosen method is discussed in detail and potential ethical issues that may affect the research have also been considered.

The inclusion of a methodology flow chart at the end of this chapter summarises how the two stages of research have been combined; and the methods and aims matrix table highlights how each research aim has been met by the chosen methods. Finally, the chapter is summarised and conclusions are drawn prior to the presentation of research findings in chapters six and seven.

In order to lay out the epistemological framework for this thesis, the following section considers theoretical paradigms related to research, focusing in particular on logistics research.

5.2 Research philosophy and logistics

This thesis has adopted a qualitative approach, which Näslund (2002, p328) defines through the identification of the differences with quantitative research, including the ability to “get closer to the actor’s perspective through detailed interviewing and observation”. Qualitative research involves a more interpretive and subjective approach

whereby “the world is essentially relativistic” (Ibid, p324) and can only “be understood from the point of view of the individuals who are directly involved in the activities which are to be studied” (Denzin and Lincoln, 1994 cited in Näslund, 2002, p324).

Research in the field of logistics to date has most prominently been of a positivist nature, due to the dominance of quantitative survey research (Näslund, 2002). Frankel et al. (2005) examined logistics research published in the *Journal of Business Logistics* between 1999 and 2004. A total of 108 articles were studied, and 51% of articles (55 articles) adopted surveys as the primary method, whilst the remaining 49% of articles predominantly used experiments and literature reviews as the primary research methods, with interview studies highlighted as the most popular secondary method. These findings support earlier research by Dunn et al. (1993) as discussed by Näslund (2002) whose review of methods used in articles published in four logistics journals discovered that 36 percent were based on surveys and or structured interviews. These studies have highlighted a growing trend towards survey and modelling research. Since the early 1990's studies have shown that logistics research has been predominantly in the positivist paradigm, resulting in more quantitative research methods being adopted. In particular survey and modelling research has dominated much logistics research conducted in the United States of America (Samuel, 1997 cited in Näslund, 2002), which according to Näslund (2002, p322) has demonstrated “a serious deficiency in logistics research”.

Näslund (2002) discussed two possible explanations for the popularity of quantitative research methods in logistics research. He argued that one such reason is the high volume of positivist research being published in leading American logistics journals, which has led to the global dominance of quantitative research, as with management studies research and literature impacts on a global scale. Alternatively, researchers may believe that research conducted using a positivist framework is easier to publish in journals than a qualitative study. This second explanation is supported by Guba and Lincoln (1994, p116) who explain that many publication opportunities are controlled by positivist researchers, particularly in the United States of America, where they also control funding sources, dissertation grading committees, and the promotion and tenure processes.

5.2.1 The Interpretivist and Positivist Paradigms

All research is influenced by the way in which people view the world around them. Näslund (2002) explains that in research, the term ‘paradigm’ is used to describe “our world-view, the lenses through which we view the world”. It is therefore important for different paradigms to be understood in order to accommodate different research

methodologies. Denzin and Lincoln (1994, p99) divide a paradigm into three parts: epistemology, ontology, and methodology. The first, epistemology addresses the way we view and understand the world and therefore how this is communicated to others as knowledge (Burrell and Morgan, 1985; Näslund, 2002). Ontology deals with reality and the existence of objectivity. Finally, methodology is the way in which knowledge about the world is gathered (Näslund, 2002); and the selection of methodology is greatly influenced by a number of factors including: previous research in the field, research objectives and the competency of the researcher (Mentzer and Kahn, 1995).

Quantitative researchers traditionally follow a positivist paradigm, which follows the belief that an objective reality exists. Therefore the methods selected in positivist research tend to be quantitative, for example surveys and statistical analysis, which reflect their desire to explain and predict through “precise, probabilistic theories” (Hunt, 1992 cited in Randall and Mello, 2012, p868). In contrast to the positivist, quantitative research is the qualitative research approach. In general this is more interpretive and subjective, where research is focused on description as opposed to prediction, as a means to gaining knowledge about the world from the perspective of individuals (Randall and Mello, 2012).

5.2.2 Criticisms of quantitative and qualitative research

According to Silverman (1993), research conducted using questionnaire methods has been criticised since the 1950’s on the grounds that it produces unsatisfactory results. Näslund (2002) highlights various criticisms of quantitative studies which include: difficulty in understanding and interpreting questionnaires; data from survey research is oriented in the past; and being of no interest for practitioners. If respondents misinterpret or do not understand survey questions the results are likely to be incomplete and difficult to draw conclusions from. Similarly, if statistical analysis is carried out on a data set which is not fully understood, the results are likely to be of little value or use (Ibid).

Another critique of quantitative studies is that survey research is “almost always...past orientated” (Näslund, 2002, p325), which has led to much survey research lacking originality or investigation of new ideas and concepts. This leads to a substantial amount of academic research being targeted at testing theories that are already well established, and essentially producing “a snap-shot of the current condition” (Ibid, p325). However, researchers can address this issue to a certain extent by including questions that enquire about a future state.

Quantitative research has also been criticised for its attempt at breaking down complicated ‘real-world’ dilemmas into smaller, more manageable research questions,

that when solved, offer no significant benefit to practitioners. Alvesson (1996, p455) explains from the perspective of leadership research that “Practitioners seem to view the abstraction of quantified material and statistical correlations as very remote from everyday practice and therefore of little use.”

As Näslund (2002, p328) points out “The inadequacies of survey research have perhaps paved the way for increased acceptance of qualitative research methods”. However, the interpretivist methods are not without their critics, and as Silverman (1993, p20) points out are regarded as only useful in the preliminary stages of research, “before the serious sampling and counting begins”. Amongst the many critical remarks made regarding the value and usefulness of qualitative research is the notion that it is unscientific; only exploratory or investigative; and is completely personal and therefore full of bias. Berg (2007, pp.3-4) notes that the practice of qualitative research is “sometimes criticised for being non-scientific and thus invalid”, because of its focus on assessing “the quality of things using words, images and descriptions” as opposed to quantitative research methods which are regarded as more scientific. Those conducting qualitative research suffer the stigma of being labelled journalists or soft scientists (Denzin and Lincoln, 1994; Näslund, 2002). However, this is not to say that qualitative research should be discounted, merely that different research problems lend themselves to different research methods. Therefore it is necessary to assess the relative strengths and weaknesses of all research forms in order to apply the most appropriate method to address the research problem, whether it be quantitative or qualitative (Silverman, 1993; Näslund, 2002). Näslund (2002, p329) points out that “there is no reason why good, scientific research could not be performed using qualitative methods.” Denscombe (2010) highlighted a number of advantages and disadvantages of using qualitative and quantitative data, these are summarised in Table 5-1 and Table 5-2 respectively.

Advantages	Disadvantages
In-depth study of specific topics creates rich and detailed data.	Due to the small sample sizes associated with qualitative research it can be difficult to determine the level of generalisability regardless of how detailed or in-depth the findings.
Accounts of social phenomena allow for a tolerance of ambiguity and contradiction.	Findings tend to be more cautious and tentative due to the assumption that the researcher's identity, background and beliefs have a role in data generation.
Accepts that different researchers using the same methods may achieve different conclusions and interpretations.	The application of codes and themes may take the meaning of the data out of context, thereby altering its original intended meaning.
Descriptions and theories drawn from qualitative research are grounded in social reality.	The complexities of social phenomena may lead researchers to underplay or possibly disregard data that is inconsistent or ambiguous relative to the rest of the data set which can lead to oversimplifying the explanation.
	Data analysis is often a lengthy process due to the unstructured form of raw qualitative data.

Table 5-1 Summary of the advantages and disadvantages of qualitative data analysis (adapted from: Denscombe, 2010)

Advantages	Disadvantages
Analysis of quantitative data is based on objective laws as opposed to the researcher's values, and hence quantitative data is suited to statistical techniques that incorporate principles of mathematics and probability.	The quality of quantitative data depends on the questions asked and the methods of data collection.
Using statistical tests of significance raises the confidence and credibility of findings.	The real purpose of the research can be lost if attention is focused too much on the technical aspects of analysis.
Interpretations and findings from quantitative data are based on measured quantities.	Although large volumes of data can strengthen quantitative analysis, too much data collected can overload the researcher.
Quantitative data analysis can be a relatively quick process.	Despite quantitative data being considered more scientific, researchers are still able to influence the analysis, and potentially biasing the findings.
Findings resulting from quantitative data can be disclosed effectively in charts and tables.	

Table 5-2 Summary of the advantages and disadvantages of quantitative data analysis (adapted from: Denscombe, 2010)

5.3 Evaluation of selected qualitative data collection methods for stage one

The decision on which data collection techniques to use is largely dependent on the nature of the research questions being asked and the competence of the researcher. The first stage of research in this thesis aimed to examine local authorities' understanding of urban freight movements and the consideration given to freight in urban transport planning and policy decision making, as per the first research aim. In addition, it reviewed current urban TDM measures and policies to determine which are responsible for the greatest conflicts between the goals of policy makers and logistics operators. It was felt that gaining understanding required qualitative and flexible investigation whereas investigating current policies should be done as a pre-interview questionnaire. Therefore, semi-structured interviews together with a pre-interview questionnaire were used in the first part of this study. The remainder of this section (5.3) will discuss in more detail, the data collection methods that have been chosen for stage one of this study.

5.3.1 Questionnaires

Questionnaires are a structured method of data collection, which enable researchers to determine both the questions asked and the range of possible answers to be provided, as often the researcher is not present whilst the questionnaire is completed (Munn and Drever, 2004), therefore removing the potential for interviewer bias. Gillham (2000, pp.1-2) explains that as a method of collecting qualitative data, questionnaires are “of most value when used in tandem with other methods”. This is mainly because researchers can have greater confidence in the findings if there is consensus amongst the results from different methods.

Many advantages of using questionnaires to gather research data have been cited. According to Gillham (2000) the greatest saving is in time, since a thousand questionnaires can be easily distributed in the time required to conduct two semi-structured interviews. It is also possible that those individuals targeted for an interview may not be readily available or willing to participate in an interview, therefore a questionnaire can be relatively low cost to administer and a quick method of eliciting information. The pre-determined nature of a questionnaire can also simplify the coding and analysis process; similarly with all respondents receiving the same questions a degree of standardisation can be achieved. Using questionnaires also has the advantage of allowing respondents to complete them at their own convenience and maintaining respondent anonymity. Although this can cause problems for the researcher as they are unable to identify who has responded, and therefore will not know who to send follow-up prompting letters to (Gillham, 2000; Munn and Drever, 2004). However, this can be resolved in a number of ways, for example by guaranteeing confidentiality and promising feedback, which requires contact details to be included in the reply, or alternatively by entering the respondents into a prize draw to help maximise the return rate (Munn and Drever, 2004).

Whilst questionnaires have the benefit of being a neat data collection technique that is relatively easy to analyse; for the respondent they are often boring and become frustrating or tedious to complete (Gillham, 2000). Since researchers do not know the reasons behind the selected responses, or what answers may have been given if respondents were able to answer outside of the pre-determined options provided, questionnaire data is often regarded as necessarily superficial (Munn and Drever, 2004).

Gillham (2000) highlights some other disadvantages of using questionnaires, such as the typically low response rate of approximately 30% on average, as many will be completed hastily with little consideration over responses. Similarly, it can be very

difficult to motivate people to respond to a questionnaire. Furthermore, without an interviewer present misinterpretations cannot be corrected, and respondents are free to select the order in which they answer the questions, effectively resulting in a different questionnaire being answered. However, respondents' answers are free from potential bias since the questionnaire is completed on their own without the presence of an interviewer (ibid).

In contrast, interviewing allows people to reflect on their responses and encourages interviewees to provide a fuller response, where a questionnaire assumes people have ready answers to the questions (Gillham, 2000). Semi-structured in-depth interviews also provide maximum opportunity for ideas between the researcher and the participant to be conveyed completely and accurately (Cannell and Kahn, 1968, p554) that survey questionnaires cannot deliver.

5.3.2 Interviews

An interview may simply be defined as a purposeful conversation that is used to collect information from selected participants (Berg, 2007). The essence of a qualitative interview lies in conversation (Kvale, 1996) and hence obtaining good data is reliant upon both the skills of the researcher at questioning and listening, as well as the respondents' ability to provide relevant answers (Rubin and Rubin, 1995 and Warren, 2001). Taylor and Bogdan (1998) explain that qualitative interviewing has been described as nondirective, unstructured, open-ended, and non-standardised; and as such the term in-depth interviewing is often used to refer to the method. Qualitative interviews are similar to standardised survey interviewing; however the purpose is very different. Whereas a survey interview may seek to "derive interpretations...facts or laws, from respondent talk" (Warren, 2001), an in-depth qualitative interviewer is focused on understanding experiences and situations from the perspective of the respondent, as expressed in their own words (Taylor and Bogdan, 1998). It is worth noting that qualitative interviews are often chosen by researchers when their "concern is with establishing common patterns or themes between particular types of respondents" (Warren, 2001).

There are various forms of interviewing that can be adopted for a variety of different uses. The most frequently referred to is individual interviewing that is conducted through an in-person (face to face) verbal exchange (Fontana and Frey, 1994). Often interviews follow one of three major formats or structures, which Berg (2007) identifies as – standardised (formal or structured) interviews; un-standardised (informal or non-directive) interviews; and semi-standardised (semi-structured or focused) interviews. Figure 5-1 summarises the main differences between the three types of interview

structure, although the main distinguishing feature between them is the level of rigidity in their structure (ibid).

<u>Standardised Interviews</u>	<u>Semi-standardised Interviews</u>	<u>Un-Standardised Interviews</u>
<ul style="list-style-type: none"> - Most formally structured. - No deviations from question order. - Wording of each question asked exactly as written. - No adjusting of level of language. - No clarifications or answering of questions about the interview. - No additional questions may be added. - Similar in format to a pencil-and-paper survey. 	<ul style="list-style-type: none"> - More or less structured. - Questions may be reordered during the interview. - Wording of questions flexible. - Level of language may be adjusted. - Interviewer may answer questions and make clarifications. - Interviewer may add or delete probes to interview between subsequent subjects. 	<ul style="list-style-type: none"> - Completely unstructured. - No set order to questions. - No set wording to any questions. - Level of language may be adjusted. - Interviewer may answer questions and make clarifications. - Interviewer may add or delete questions between interviews.

Figure 5-1 Types of interview structure by level of formality (Adapted from: Berg, 2007)

All research methods and techniques for data collection have their strengths and weaknesses. Qualitative in-depth interviews are particularly appropriate under the following circumstances: when there are relatively clear and well defined research questions; when it may be difficult or not possible to access particular settings or individuals; when there is limited time available to collect information that would otherwise have been gathered through participant observation; and if the objective of the researcher is to understand a wide range of settings or people that contribute towards the establishment of general theories (Taylor and Bogdan, 1998).

Some common weaknesses are mentioned by Taylor and Bogdan (1998) citing Becker and Geer (1957). The reliability of the responses can be difficult to determine since people respond differently under different circumstances and therefore an interview may elicit an unreal response. A second limitation is that of misinterpreting a respondent's use of language leading to the interviewer making assumptions that may be incorrect; only through researcher participation could some of these issues be avoided or at the very least minimised. However, Taylor and Bogdan (1998, p92) recommend "getting to know people well enough to understand what they mean, and creating an atmosphere in which they are likely to talk freely" as a possible way towards overcoming these limitations. In this case such an approach was not feasible due to the limited timescale for recruiting and meeting participants.

Another factor to consider when using interviews as a method of gathering research data is the choice of mode, either in-person or by telephone. Shuy (2001) explains that there are particular advantages and disadvantages associated with conducting interviews over the telephone and in-person. For example, when time is short, a

telephone interview can prove a cost-effective way of obtaining a complete interview (Shuy, 2001), mainly due to the speed of questioning that tends to be higher over the telephone as respondents provide shorter answers to open ended questions (Sykes and Collins, 1988); which results in telephone interviews taking approximately 10-20% less time to conduct (Groves, 1978, 1989). However, Lavrakas (1993) points out that interview topics involving complex issues are easier to conduct in-person, as it helps to avoid impatience and fatigue associated with long duration telephone conversations, and helps interviewers to achieve more accurate responses (Shuy, 2001). The visual indication from a face to face interview also encourages respondents to provide more thoughtful and explanatory answers, resulting from the contextual naturalness which leads people to talk more openly and at ease (Shuy, 2001). Groves (1979) also argues that interview respondents prefer to be questioned in person as opposed to over the telephone, which has the potential to lead to higher response rates.

Shuy (2001) recommends that researchers use the following nine criteria to help assess the most appropriate mode (telephone or in-person) for their interviews:

1. Type of interview to be conducted (e.g. research; polling; journalistic; medical etc.)
2. The type of information desired (e.g. demographic; personal; sensitive).
3. Interviewee's attitudinal variability; safety and workload.
4. The requirement for consistency and uniformity amongst multiple interviewers.
5. Participant's social variability (e.g. age; gender etc.)
6. Need for response and setting to be contextually natural.
7. The ability for participants to respond without being influenced by the questions.
8. Complexity of the issues and questions.
9. Economic, time, and location constraints.

In this case the preference was for in-person interviews wherever possible, with telephone interviews being used when participants were unable to meet in person. This was particularly useful for some of the freight operators who were included in the participant sample; due to the mobile nature of their role as transport managers based at multiple locations around the UK, which made arranging a suitable venue for an interview more complex.

5.4 Justification and implementation of research methods used in stage one

The decision on which data collection technique to use is largely dependent on the nature of the research questions being asked. As the first stage of this study is aiming to: examine local authorities' understanding of urban freight movements and the consideration given to freight in urban transport policy decision making; and to perform an analysis of current urban Transport Demand Management (TDM) measures and policies to establish which cause the greatest conflicts between the goals of policy makers and those of logistics operators; in-person semi-structured in-depth interviews together with a pre-interview questionnaire were conducted. This decision is supported by Taylor and Bogdan (1998, p98) who explain that interviews are particularly effective in research that is attempting to understand the perceptions of participants; therefore interviews appear the most feasible and appropriate research technique to adopt for this stage of the study.

Typically logistics research involving practitioners and policy makers adopts either questionnaire surveys or an interview approach, as seen in the work carried out by Morris et al. (1999); Browne, Allen and Anderson (2005); Browne, Sweet, Woodburn and Allen (2005); Stathopolous et al. (2010); and Dablanc et al. (2011). For some of the issues to be researched thoroughly, a specific and deep knowledge is required from the stakeholders invited to take part. Therefore, individual semi-structured interviews were conducted that included a combination of open and closed questions asked in a reasonably logical order. Semi-structured interviews were selected for the first stage of the study because they allow greater flexibility in terms of order in which issues and questions are raised, and they also allow the respondents greater freedom to provide more detailed, open-ended answers. The one-to-one setting also helps to make these interviews relatively easy to arrange and control, whilst transcription is easier if they are audio-recorded. Despite the many disadvantages associated with telephone interviewing (as discussed in section 5.3.2), each potential participant was presented with the option of a telephone interview.

5.4.1 Recruitment of interview participants

This thesis identifies and studies the UK logistics and transport industry together with local transport planners and policy makers, as the core stakeholders in urban freight transport. A combination of purposive and snowball sampling strategies have been used to identify and recruit a number of suitable participants to invite for an interview. It was necessary to invite a variety of people from each stakeholder group for an interview so as to uncover a broad range of perspectives and to maximise the potential

for the interviews to develop theoretical insights towards answering the research questions (Taylor and Bogdan, 1998). Therefore, it was hoped that between ten and twelve people for each stakeholder group would be recruited to take part in an interview, thereby creating a total sample of approximately twenty to twenty-four interviews. It was anticipated that once these interviews had been completed that any additional interviews would “yield no genuinely new insights” (Taylor and Bogdan, 1998, p.93).

Initially, only transport planners in local authorities (councils) from within the Yorkshire and Humberside region were approached to take part in the research. This geographic region of the UK was originally selected since it encompasses a diverse number of urban areas, each with a variety of freight and distribution related issues, and would also reduce the amount of travelling time required between interviews. However, due to the snowballing strategy that was used to recruit further participants, the initial study area was widened to include transport planners from across England, which also had the benefit of helping to ensure that any trends identified in the initial area of study were not unique to the region, but could be found elsewhere.

Potential interviewees were identified for each council where a contact was already known to the research team and an email was sent out inviting them to take part in a research interview. Additional email invitations were sent to generic email addresses for other councils through either customer services or ‘cold calling’ to identify a suitable contact. Other interview participants were recruited through a process of ‘snowballing’ (Berg, 2007) whereby some early interviewees acted as “key informants” (Warren, 2001; Holstein & Gubrium, 1995; Spradley, 1979) recommended and referred contacts in neighbouring local authorities. The sample of participants interviewed from local authorities was intended to cover a variety of types of urban area including historical cities, port cities and cities which form part of urban conurbations. In total, twenty nine local authority representatives from across England were contacted about the research. However, only twelve agreed to take part in an interview; ten did not respond; one declined but suggested an alternative contact who did take part; and five people just supplied potential contacts at other local authorities.

The second group of urban stakeholders interviewed included practitioners from the logistics and transport industry, predominantly from companies who undertake a large proportion of their operations in urban areas making deliveries or collections. Interviewees were selected based on the researcher’s knowledge of the selected industry, whereby participants were representative of the wider population of interest; which is referred to as a ‘purposive’ or ‘judgemental’ sample (Berg, 2007). A desk

based internet search identified organisations from a range of sectors that operate in the urban environment. These included couriers; retail distributors; hauliers of food and grocery products; general distribution; waste management providers; and industry trade bodies. Invitations to participate in an in-depth semi-structured interview were distributed via email and letter to potential participants already known to the research team. The remaining companies identified from the internet search were approached through a letter, which included an information sheet detailing the research project, a pre-interview questionnaire, a reply slip and a freepost envelope to encourage a response. Invitations were sent out to a total of sixty eight freight operators inviting them to take part in a research interview, although only nineteen responses were received of which only ten resulted in an interview.

5.4.2 The pre-interview questionnaire

Prior to each interview taking place, interviewees were asked to complete a pre-interview questionnaire, which helped to utilise the time spent in the interview more effectively. For the local authority interviews the questionnaires were distributed via email to individuals who agreed to take-part in an interview. As discussed earlier in section 5.3.1 a questionnaire was most relevant way of collecting pre-interview data, before an in-depth semi-structured interview was conducted. The purpose of this questionnaire was two-fold, firstly it enabled generic background information to be collected from each interviewee about the transport demand management measures and policies currently operating on their authority's road network, and secondly it helped to prepare each respondent for their forthcoming interview.

The pre-interview questionnaire for representatives of the freight transport industry was more concise. It was used to collect information about the company's vehicle fleet, the nature of its business operations, the types of urban area they operate in and the frequency of trips to those urban areas. This provides important context for interpreting the interview process. As noted in Chapter two (section 2.3) operators range widely in their characteristics. In contrast to the local authority questionnaire, the industry pre-interview questionnaire was mailed out with the invitations, so as to minimise the amount of extra time required of respondents prior to an interview. The final section of both questionnaires provided respondents the opportunity to propose any urban freight issues that they wished to discuss during their interview.

5.4.3 In-depth semi-structured interviews

All the interviews were conducted on a one to one basis, with the exception of one local authority where two participants were present. All the participants were offered the choice between an in-person interview and a telephone interview, whichever was more

convenient for the interviewee. The questions asked in the interviews were developed from the literature review as recommended by Warren (2001) and cover the three categories of question that should be used in a qualitative interview as identified by Rubin and Rubin (1995). These are: 1) Main questions used to begin and guide conversation; 2) Probing questions used to either clarify responses or request further examples; and 3) Follow-up questions that search for the meanings of answers to main questions.

The interview questions were designed around the first three research aims and their subsequent objectives:

Aim 1: To examine local authorities' understanding of urban freight flows and the consideration given to freight in urban transport policy decision making.

- Determine local authorities' perceptions of urban freight and their ability to manage it.
- Establish current sources of data on urban freight.
- Understand the actors involved in discussing freight transport policies.
- Verify the level of engagement that local authority transport planners and policy makers have with private sector stakeholders.

Aim 2: To perform an analysis of current urban Transport Demand Management (TDM) measures and policies, to establish which cause the greatest conflicts between the goals of policy makers and logistics operators.

- Identify the most commonly applied TDM measures and policies, with reference to urban freight.
- Understand what impacts the TDM measures and policies are aimed at alleviating.
- Determine which TDM measures and policies inconvenience logistics operators the greatest.

Aim 3: To create awareness amongst local authorities of the implications that their urban policy decision making has on essential freight movements and operations.

- Identify the negative implications of urban transport policies on freight operations.
- Understand the impact of local authority policy interventions on urban freight.
- Establish the requirements of logistics operators in urban environments that would enable them to operate more efficiently.

The questions prepared for the interviews (Appendix V – Interview Guide) were divided into two sections. The questions in the first section differed between the two stakeholder groups interviewed, with one set specifically written for the local authorities and another for the freight industry representatives. Where permission from the participants was granted, interviews were audio-recorded for ease of transcription, so as to limit misinterpretation.

Questions in the first section for local authorities aimed to understand the processes behind policy selection and implementation, and the consideration of freight in current and future plans. The interview questions for local authorities covered the following topics: processes used by local authorities to select transport policies for inclusion in LTP's; determining policy timeframes from approval to implementation; barriers to policy selection; and the extent to which transport planning and policies impact freight movements. These were devised from the evidence discussed in Chapter Two (section 2.2 and 2.3).

For the interviews with representatives from the freight industry, the questions in section one were replaced with ones tailored towards the logistics and transport industry. Their objective was to investigate the effects of, and responses to current policies, and also understand the relationship between industry stakeholders and policy makers. The specific interview questions for freight transport stakeholders included the following topics: the consistency of different local authority approaches towards freight issues; the level of involvement between local authorities and transport operators; freight operator perceptions of existing transport policies and their impact on operations; and levels of favourability towards existing transport policies, including shared bus and lorry lanes and urban congestion charging schemes. These were derived from the evidence in Chapter Two (section 2.4).

The questions in the second section were more generally applicable and therefore were included in both sets of interviews. These focused on general perceptions of

urban freight, including its importance in the urban economy and the extent to which freight is important to local politicians. Section two concluded with some questions aimed at identifying the greatest challenges facing the future of urban freight transport operations.

5.4.4 Thematic content analysis of interview data

Following the collection of semi-structured interview data, each interview was transcribed onto a Microsoft Word document and imported into the QSR NVivo data management program. This software assisted a comprehensive process of data coding (using the pre-determined question topics from the interview guide), and the organisation of information collected to enable common themes emerging from the interviews to be identified and developed. Figure 5-2 shows how common themes in the interview transcripts were highlighted and coded with the aid of NVivo software.

The screenshot displays the NVivo interface for a project titled 'LTA Views on Urban Freight Policies (2).nvp'. The 'Nodes' pane on the left shows a tree structure with 'Free Nodes' selected. The 'Free Nodes' table lists the following nodes:

Name	Sources	References	Created On	Created By	Modified On	Modified By
Challenge	8	25	11/03/2011 11:38	E	18/05/2011 11:50	E
Freight ex	8	16	13/04/2012 14:08	E	16/04/2012 10:54	E
Future sc	8	9	11/03/2011 11:49	E	18/05/2011 11:49	E
Influence	12	49	27/10/2010 09:11	E	03/11/2010 07:49	E

The main text area shows a snippet of an interview transcript with several codes applied. The codes are: 'Local authority understanding of', 'Importance of Economy', 'Problem Identification', 'Awareness of Urban Freight Problem', 'Solutions Identified', 'Own Knowledge', and 'Coding Density'. The transcript text includes:

R2: I think the economy or bamsley is going to be aia on the type or industries that require freight, other new industries and transport links and new industries coming up on the old coal mining sites are accessed by freight. They are going into the cheap land on the outskirts, so from an economic point of view freight is going to be paramount in the next few years or so, because a thousand new jobs have just been created on an industrial estate near Grimethorpe and it's the strategic links between there, as Bamsley is right in the centre of the country and motorway network.

Reference 5 - 0.42% Coverage

R2: Yes. Bamsley has very few economic advantages over Sheffield or Leeds so we have to play what we have got and what we are good at. One of the things is cheap sites that can easily be accessed by freight.

Reference 6 - 0.01% Coverage

EEB: So you would want to use a consolidation centre primarily for the town centre high street retailers?

R1: That's right yes, because if on an average morning you walk through the town centre, like many town centres there's literally dozens of delivery vans all delivering to the various stores, sp if that could be consolidated on a couple of loads at a consolidation centre that could be done really easily.

Reference 7 - 1.67% Coverage

R1: We have got all the signage in place and those policies in place. We have done a dedicated low bridges map for the Penistone area which is fine for the English drivers but when you've got a 'Ukrainian driver coming across it there can be problems. Generally I think we have had quite a positive effect on freight have our policies, because we've not got much congestion. We also have one or two routes where we have directed HGV's away from the town centre into Carlton Industrial Estate, where Marks & Spencer sandwiches are made, as you can imagine quite a lot of freight moves from there. So we've aimed specific routes for drivers to avoid town centre to get to that

Figure 5-2 Coding by theme using NVivo

Aronson (1994) suggests thematic analysis be used to analyse data that is collected through in-depth interviews. This method of qualitative analysis is a way of identifying important patterns within a data set, where the emergent themes become categories for analysis (Fereday and Muir-Cochrane, 2006). Taylor and Bogdan (1998) define themes as units of patterns identified in the data, which may include recurring activities,

meanings, feelings, or conversation topics. Although Boyatzis (1998) presents a broader definition of a theme as “a pattern in the information that at minimum describes and organises the possible observations and at maximum interprets aspects of the phenomenon”. Therefore, in order to identify a theme, Leininger (1985) explains that components or fragments of ideas and experiences from within the data need to be brought together, as often the individual pieces are meaningless on their own.

Braun and Clarke (2006) discuss a number of advantages of employing thematic analysis in qualitative research. Firstly, it is a relatively quick and easy method to learn and carry out, which makes it accessible to researchers with little or no prior experience of qualitative research. The flexibility of the method also allows the researcher to determine themes in a variety of ways, whilst usefully summarising the key features of a large body of data. It can also generate unanticipated insights and highlight similarities and differences across the data set, producing results that are generally accessible to the educated general public. The method can also be useful for producing qualitative analyses suited to informing policy development. However, despite its extensive application it has faced some criticism over the lack of a clear and concise set of guidelines to enable its application (Boyatzis, 1998; Braun and Clarke, 2006).

Owen’s (1984) criteria for identifying emergent themes in interview data analysis were used to identify the common themes amongst the interview findings. These criteria are: 1) Recurrence - where at least two parts of the discourse reflect the same thread of meaning, even though different words express the same meaning; 2) Repetition - occurring when keywords, phrases, or sentences are repeated verbatim in at least two parts of the discourse; and 3) Forcefulness – identified through significant changes in volume, tone or inflection in oral discourse, putting an idea first in a list or explanation, the use of dramatic pauses or introductory follow-ups or phrases that indicate the importance of a segment of discourse (e.g. “what I really think is...” or “so that’s what I really think...”).

As explained in section 5.4.2, the interview questions were designed around the first three research aims and their objectives. These led to the emergence of seven core themes that were used to organise the interview data, from which a number of sub-themes arose:

- Understanding urban freight flows
- Recognition of freight transport in urban areas
 - ↳ Contribution of urban freight to the economy

- ↳ Public and political recognition of urban freight
- Relationship between local authorities and urban freight stakeholders
 - ↳ Current levels of engagement between stakeholders
 - ↳ Influence of freight stakeholders on policy selection
 - ↳ Use of FQP's to engage urban freight stakeholders
 - ↳ Role of industry trade associations in influencing transport policy
 - ↳ Opportunities for future engagement between stakeholders
- The main problems associated with urban freight operations
 - ↳ Impact of urban freight on air quality
 - ↳ Impact of urban freight on traffic congestion
 - ↳ Impediments to urban freight operations
- Local authority interventions
- Challenges for the future
 - ↳ Demand challenges
 - ↳ Environmental challenges
 - ↳ Network management challenges
 - ↳ Challenge of switching mode
- Future issues and reactions to potential scenarios
 - ↳ Consolidation centres
 - ↳ Urban congestion charging
 - ↳ Lane share schemes

These themes were then used to help inform the second stage of the research, and to identify a suitable and relevant topic for the workshops to focus on.

5.5 Evaluation of selected Group Work Techniques suitable for stage two

The aim of the second stage of research in this thesis was to create and test a process that enables the interests of freight stakeholders to be considered in the design of future urban TDM measures and policies, so that they fully identify and incorporate the needs of urban logistics activities. Since current urban transport planning does not formally involve freight stakeholders, it is therefore necessary to understand how

engagement between policy makers, freight operators and other urban stakeholders can contribute to the creation of better informed, more efficient urban transport policies in the future. As freight operators are primarily concerned with profit making activities, their interests often come into conflict with those of local authorities who are tasked with balancing the needs of multiple stakeholders, as explained in chapter two.

Positional Analysis (PA), as discussed in the previous chapter (section 4.4.4), provides a method for illuminating the conflicting interests of multiple stakeholders so as to provide a broad view of the problems and issues from different stakeholder perspectives. This enables the potential consequences of the proposed alternatives and solutions for addressing the issues to be identified so as to inform a more democratic decision making process. Therefore, the second stage of the research focused on developing and proposing a potential method for a variety of urban freight stakeholders (both public and private sector) to collaboratively address urban freight problems and issues. By incorporating components of PA urban freight stakeholders are able to understand each other's positions; collaboratively generate a selection of alternatives to address urban freight problems and issues; and determine the likely impacts of proposed alternatives.

This section (5.5) will therefore discuss in more detail, the group work techniques that have been considered for use in the second part of this study, including focus groups, Nominal Group Technique, and the Delphi technique. Particular attention is paid to those that have been incorporated into the design and development of the facilitated group workshops. Facilitated group workshops were chosen for the second part of this study because they enabled various stakeholders to have the opportunity to meet and work together at solving a mutual problem related to urban freight. A discussion on the implementation of these workshops will follow in section 5.6 of this chapter.

5.5.1 Focus Groups

Focus groups (previously referred to as 'group interviews' until the 1980's) are a method of interviewing between 6-12 unrelated individuals, through a facilitated group discussion on a particular topic or topics (Stewart and Shamdasani, 1990, Weisberg et al. 1996, Berg, 2007). The main goal of a focus group as described by Rubin and Rubin (1995, p140) is "to let people spark off one another, suggesting dimensions and nuances of the original problem that any one individual might not have thought of." Therefore, focus group scenarios have the capacity to generate a far greater number of ideas, issues or solutions to a problem than an individual in-depth interview may accumulate. Krueger (1994) explains that focus group data is qualitative, comprising of

attitudes, perceptions and opinions belonging to the participants; and that results are produced from a combination of open-ended questions and participant observation.

Focus group research is particularly useful for exploring new areas of research, which allows the researcher to get a general feel for how people perceive particular issues. It can also help researchers to understand underlying motives and meanings that explain particular views and opinions; to gauge the extent to which there exists a fair level of agreement and shared views regarding a specific topic (Berg, 2007). Stewart and Shamdasani (1990) list seven uses for which focus groups are suitable: obtaining general background information on a particular topic; generating research hypotheses for use in further research; stimulating new ideas and concepts; diagnosing the potential for problems with a new program, service or product; gathering opinions on products, services and other things of interest; understanding how respondents talk about the phenomenon of interest; and interpreting previously gathered qualitative results.

As a method of gathering qualitative data, there are a number of advantages associated with using focus groups compared with other techniques (Berg, 2007; Stuart and Shamdasani, 1990). These include: a high level of flexibility (in terms of participants, cost and time); a large amount of information can be collected from a potentially large number of people over a short period of time; they enable researchers to understand how group members reach or alter their conclusions on a particular topic or issue; participants are equals with each other and the researcher providing opportunities for clarification, follow-up questions and probing; related unanticipated topics that arise during discussions can be explored; and since complex sampling strategies and statistical analyses are not required, the verbal responses of most respondents are relatively easy for researchers and decision makers to understand.

Despite the number of advantages that focus groups can offer, there are several limitations (Berg, 2007; Litosseliti, 2003; Gibbs, 1997; Krueger, 1994; Morgan, 1988, 1993; Stewart and Shamdasani, 1990). These disadvantages include: quality of data dependent on the facilitator's ability to motivate and moderate the group; since attendance is voluntary, no-shows could result in an insufficient group size (although most commercial research organisations organise monetary and other incentives to encourage participation); responses represent group opinions which limit the generalisability of findings to a wider population; there is also a danger of a couple of strong personalities dominating a session and biasing the outcome; and a facilitator could (knowingly or unwittingly) provide cues that could manipulate participant responses and bias the findings.

Berg (2007) explains that a key difference between focus groups and interviews is the opportunity to observe interactions about a discussion topic during a focus group, although interviews can achieve a more detailed pursuit of content. The dynamics of a focus group allow participants' views to dominate, which often lead to spontaneous responses as participants formulate opinions after hearing from other group members, thereby removing the researcher's perspective from the data (Taylor and Bogdan, 1998; Berg, 2007). However, despite the information collected through a focus group providing similar types of data to that gathered in a traditional interview, the data is not of the same depth as that collected in a long semi-structured interview.

For the second stage of the research, the many advantages associated with focus groups described above, make it well suited to encouraging joint participation in a workshop setting. In particular the flexibility of the method to enable group participants to interact as equals and reach conclusions on a particular topic is important for encouraging stakeholder collaboration. However, the danger of some participants dominating the group, potentially limiting the level of consensus means that other group work techniques need to be incorporated into the workshop format.

5.5.2 The Delphi Technique

This technique "derives its name from the Oracles of Delphi in ancient literature who were reputed to be able to see the future" (Stewart and Shamdasani, 1990, p23); although the technique itself was invented by Olaf Helmer to reap the benefits that can be achieved through pooled intelligence (Moore, 1994). In essence, the Delphi technique is an application of the Nominal Group Technique that is used to forecast future trends and events, based on collective expert opinion (ibid).

In order to perform a Delphi study, a panel of experts are identified and selected based on the subject of interest. This panel is then asked to independently forecast future trends and events; and to provide the assumptions on which their forecast is based. The researchers then summarise the independent forecasts and identify the key assumptions. These summaries are provided to the whole panel, and the members are asked to provide a new forecast based on the summary information. The process of summarising and requesting revised forecasts from panel members is then repeated until either a consensus of opinion is achieved or individual forecasts no longer change. Often no more than three or four repeats and revisions are necessary to form conclusions.

Delphi study facilitators have a crucial role as they are in control of the key elements (expert selection; question design; individual summaries), which is especially important as the group does not meet face to face (Stewart and Shamdasani, 1990). Therefore,

since participants do not meet in person, this technique could not be incorporated into the collaborative group setting designed for the workshops. Furthermore, the focus of this study is about identifying improved means to formulate policy. The Delphi technique is therefore not suitable as it is very future oriented and does not transparently deal with conflicts.

5.5.3 Group Techniques for Idea Building

A number of techniques for group working were reviewed for potential inclusion in the workshop design, including Nominal Group Technique (NGT) and Idea writing. These techniques have emerged since the 1970's for use in focus groups and workshops to aid group problem solving (Moore, 1994). They are based on Osborne's work on creativity, which began in the 1930's, although they were not published until much later. In 1975, Delbecq and associates published Nominal Group Technique, which was closely followed by Warfield's Idea Writing method in 1976 (Moore, 1994). Each of these techniques had been designed to overcome some of the problems that are likely to occur in group work, such as avoiding the occurrence of verbal aggressiveness and status, thereby enabling groups of strangers to work more effectively together. This results in the generation of a far wider list of alternatives than would ordinarily have been produced in a more traditional setting. (Delbecq, van de Ven and Gustafson, 1975)

NGT is simply a format for structuring small group meetings that aims to develop a consensus of group opinion. The method enables individual judgements about a given topic or issue to be pooled and utilised in situations where there is uncertainty or disagreement on the nature of a problem and its possible solutions. It is a tried and tested process that has been used extensively in business and government, where it has succeeded in encouraging citizen participation in program planning. NGT is most suited to groups consisting of participants who are strangers, and is helpful in the identification of problems, exploration of potential solutions and establishing priorities. (Moore, 1994)

As with any other method, NGT has its benefits and limitations. Moore (1994) highlights the following benefits of using NGT: that is easy to learn and implement in practice; and enjoyable for participants, especially when they realise how productive they have been in a short period of time. Stuart and Shamdasani (1990) also mention that NGT may be useful when the majority of group members share the same general opinions. However, as Moore (1994) points out, the ease of implementation can cause NGT to become overused in problem-solving scenarios; repeated use is likely to limit the results if used on the same group of participants as the novelty of the technique wears

off; and it can also be inappropriate when groups consist of highly vocal or outspoken participants since they are unable to control the outcome and may attempt to modify the process.

According to Moore (1994) there are four key steps in the NGT process:

- 1) Idea writing – whereby participants independently write down their responses to a stimulus question in silence.
- 2) Group recording of ideas – participants take turns to contribute ideas (a single idea at a time) to be recorded on flip chart paper.
- 3) Discussion about the listed ideas – to establish the meaning of each idea amongst all group members.
- 4) Voting and ranking of ideas – participants each vote for the ideas they deem the most important and rank them in order of their preferences, then the pattern of votes is discussed.

Ritchie (1985) and Spencer (2010) add two further steps in the NGT process, which are a discussion on a preliminary vote, followed by a final discussion and vote on the most popular ideas and suggestions.

It is customary for the voting stages of an NGT session to use the method described by Delbecq, Van de Ven, and Gustafson (1975), whereby participants are instructed to individually select a specified number of ideas (e.g. eight) that they consider to be most important. Participants then write each of the selected ideas on small cards which are then placed in rank order. The recorded votes are then used in a wider group discussion (Moore, 1994).

Moore (1994) recommends five to nine people per NGT group, and groups consisting of twelve or more people should be sub-divided into smaller groups. It is estimated that the entire process can be completed in a time frame of 75 minutes; however by limiting the second and third steps, it is possible to complete the whole process in an hour.

Since NGT is a single question technique, it is important that the stimulus question used in step one is carefully prepared in order to evoke responses at the desired level of specificity. Therefore, before composing the stimulus question it is important that the objectives of the meeting are clarified and some illustration of the types of items desired from the group be prepared. In addition, the group meeting should commence with a clear opening statement in a plenary session to set the tone for the whole meeting. This statement should highlight: the importance of the task and the unique

contributions of each group member; the sessions overall goal and how the NGT results will be used; and conclude with a brief summary of the four-step NGT process.

In summary, the most effective uses of these techniques in social research enable: the quality of meetings between people who have not worked together previously to improve; a rise in group productivity; the elimination of confusion; promoting the creation of alternatives; and facilitates good time management. In addition, Moore (1994) notes that experienced group facilitators who trialled the techniques, agreed that the processes assist the elimination or reduction of such problems as: the generation of few ideas; some members dominating the group; a distorted result due to group members responding strongly to the status of certain individuals in the group; or the influence of a political problem. These processes facilitate more productive group work by enabling a considerable amount of work to be accomplished in a short space of time, and assist people who have not worked together previously to effectively combine their ideas in a group setting (ibid).

The aforementioned methods for group working are typically used to address ill-defined problems that require people who are (or will become) responsible for the problem and its solution to participate in group problem-solving. Moore (1994) explains that such a group will likely be heterogeneous and involve policy makers, as well as people who have a direct stake in the outcome (Ibid, 1994). For use in the second stage of this research, these methods facilitate a simple, interactive process that can be used with a wide range of topics; and can be explained and carried out in a relatively short period of time with a group of freight stakeholders. Therefore, these group work techniques have been adapted for use in the final stage of this research to aid the generation of recommendations for action, based on the research results and establish priorities among the findings. In terms of participants, the policy makers (as mentioned above) were represented by local authority transport planners, and the remainder of the group participants included practitioners from the commercial freight transport industry.

5.6 Local Authority & Freight Operator Workshops

For the final stage of the research (as illustrated in Figure 5-3 at the end of this chapter), representatives from local authorities and the UK freight transport and distribution industry were invited to take part in one of three inter-active workshops. Each of these workshops was entitled 'Integrating Logistics & Urban Transport Policy'. Workshops were chosen for the final stage of study because they enabled various stakeholders the opportunity to meet and work together at solving a shared problem. Each workshop lasted approximately four hours (over a morning) which included a break in the middle for refreshments and networking.

The three key objectives for each workshop were:

- 1) To create awareness of the implications that urban transport policy decision making has on essential freight movements and operations.
- 2) To identify a range of possible solutions for servicing urban areas more efficiently, whilst alleviating problems caused by urban traffic congestion (reduce air & noise pollution caused by stationary vehicles, create safer urban environments, improve existing policies that may no longer apply).
- 3) To understand how engagement between policy makers, freight operators and others can contribute to the creation of better informed, more efficient urban transport policies in the future.

5.6.1 Recruitment of workshop participants

No statistical calculation was used to determine a target sample size, however, as elements of the nominal group technique were used, Moore's (1994) recommendation that a total group should consist of no more than twelve participants was used as a guideline, and that the group would be split into two smaller working groups. Therefore, approximately half of the participants were to be recruited from local authorities and the remaining half from the freight transport industry. This enabled participants to remain with their sector representatives (local authorities in one group and freight transport industry in the other) for the activities in the first two sessions of the workshops.

A detailed literature review of the research topic identified key stakeholder groups to approach. These groups included representatives from local authorities nationwide, and representatives from the logistics and freight transport industry, whose vehicles operate in urban areas. Initial contact with representatives from local authorities was made in-person at networking events (Chartered Institute for Logistics and Transport – CILT (UK); Intelligent Transport Systems – ITS UK); whilst others were recommended by personal contacts and contacted through either email, telephone or letter. It was also necessary to make contact with relevant businesses (logistics operators, retailers etc.), therefore advertisements were also distributed through relevant industry channels (as mentioned above) and through the researcher's page on the university's department website. People who took part in the earlier interview research were also invited to take part.

Since this was a qualitative workshop study, a theoretical sampling strategy was adopted, whereby participants were selected from key stakeholder groups based on their level of knowledge and familiarity with the research topic. Some participants were recruited through a 'snowballing process', where some respondents were asked to

recommend other contacts that may be suitable to take part. In addition, each person that was sent a personal invitation was also asked to forward the advertisement onto anyone they thought suitable who may wish to take part in a workshop.

The advertisements and invitations informed potential participants the background to the study, a brief overview of the workshop objectives, and the means to register their interest and attendance at a workshop. These communications also explained that all personal information gathered during the course of the research project would be kept strictly confidential, and that anonymity would be maintained in reports and publications that result from the study. On arrival at the workshops, each participant was also asked to complete a consent form prior to commencement of the activities.

For the first workshop, seven people took part. To achieve this, twenty two personal invitations were sent out. Of these nine declined, seven did not respond and six confirmed attendance, although only 5 were present on the day. A further two participants were recruited from advertisements emailed to ITS (UK) and regional CILT (UK) members. For workshop two, eight participants attended. These were partly recruited through personal invitations. Fifteen invitations were sent. Two people declined, eleven did not respond and two confirmed attendance. Others were recruited through email advertisements, which attracted interest from a transport consultant, eight industry representatives and five local authority employees. Of these, three freight industry representatives, two local authority representatives and the consultant attended on the day. For the final workshop, nine people participated in the event. Three were recruited through personal invitations, of which six were sent out. These were two local authority representatives and one industry representative. A further two local authority representatives and four industry representatives attended in response to email advertisements.

5.6.2 Workshop venues

The workshops took place in three locations around the UK; with the first workshop held in Wetherby, West Yorkshire targeted at capturing participants from within North and West Yorkshire, and Humberside; the second targeted people from South Yorkshire and the Midlands, which was held in Rotherham, South Yorkshire; and the third workshop took place in the South, in Basingstoke, Hampshire. Potential participants were initially invited to a workshop in their region but also given the opportunity to attend whichever was the most convenient for them. Hotel meeting rooms were booked in each location, with venues selected for their ease of access to the motorway network, with ample free car parking available, since it was envisaged that most participants would travel by car to each workshop.

5.6.3 Incorporating NGT and Idea Building into workshop activities

One of the most common reasons for using the NGT is so that individuals' responses are not biased or influenced by the general group opinion or the opinions of the most dominant group members. Since this technique is occasionally combined with a more traditional focus group so that the research can benefit from the advantages of both methods, it was decided that the processes of NGT and idea building would be combined with the discussion element of focus group research to create interactive workshops. Therefore the workshops followed an adaptation of the NGT format (Moore, 1994), which enabled some action research to be carried out under the guise of individual 'Idea writing' (Warfield, 1976).

These workshops enabled the fourth and final aim of the research presented in this thesis to be met:

Aim 4: To create and test a process that enables freight stakeholders to be included in the initial creation and design of future urban TDM measures and policies so that they fully identify and incorporate the needs of urban logistics.

- Facilitate collaboration between local authority and private sector stakeholders to address urban freight problems and issues.
- To understand how engagement between policy makers, freight operators and other urban stakeholders can contribute to the creation of better informed, more effective urban transport policies in the future.

5.6.4 Workshop format

The theme of the workshops focused around one of the central interview topics, which investigated the stakeholder perspective of the greatest impediments to logistics operations in urban areas. The stimulus question used at each workshop was: 'In what ways could urban transport policy be amended to improve operations in urban areas that will ease current urban traffic problems?'

In order to use the adapted NGT and Idea building techniques, the workshops were divided into four sessions, as outlined in the workshop programme (Table 5-3). There were two facilitators involved with each workshop, which enabled one person per group to act as leader, collating ideas and facilitating discussions. The participants at each workshop were divided into groups according to type of stakeholder. For the first two sessions the participants were put into one of two groups; one group was for local authority representatives and the other group was for freight operator stakeholders. After the break, for the final two sessions the participants were re-distributed into two mixed stakeholder groups.

Time	Activity
08:30	<i>Registration & bacon sandwiches on arrival</i>
08:45	Welcome and brief introduction
09:00	Session 1 – Idea Generation (Split into two groups)
09:45	Session 2 – Plenary I
10:30	<i>Break – Tea & Coffee</i>
10:45	Session 3 – Preferences (Split into two mixed groups)
11:15	Session 4 – Plenary II
12:30	Closing remarks & opportunity for feedback

Table 5-3 Workshop Programme

In Session 1, blank note paper headed with the stimulus question was provided to each participant who was asked to generate responses (in brief sentences or phrases) to the stimulus question. These ideas were then combined into a group list through a round-robin style sharing of ideas and recorded by the facilitator on flip chart paper. Each idea proposed to the group was briefly explained and discussed prior to the first plenary session. Flip chart paper was used by the facilitators throughout the duration of each workshop to record and display the participants' ideas during each session.

At the end of the second session the two facilitators combined the ideas put forward from both groups and formed one cohesive list. This served to eliminate any duplication of ideas, whilst editing and expanding upon other ideas put forward during the session. Following a brief explanation and discussion regarding the interpretations and potential implications of each idea, the participants were instructed to vote and rate each idea that was put forward, using a pre-prepared voting sheet (Appendix X-voting sheet). Traditionally, the voting and ranking session uses a system of 3x5 cards to rank the ideas or options in terms of their relative importance, so as to establish the relative desirability of an idea for corporate diversification (Ritchie, 1985). However, in place of this, a pre-prepared voting sheet was employed to assist the participant's assessment of each option. Due to the limited time available at each workshop, this is a simpler voting method that is easier to explain to participants and takes less time to complete.

The participants were rating the ideas generated on both the effectiveness at addressing the problem, and the likelihood of it providing an acceptable solution in practice. In addition, each participant was asked to rank the ideas in order of

preference. The concept of asking participants to vote and rank ideas is based on the component of PA that requires alternatives to be ranked in order of preference (Söderbaum, 1982, 1998; and Moberg, 1999), which was discussed in the previous chapter. The results of these votes served as an indication of the similarity between different stakeholders' views towards collaboratively generated ideas for addressing urban freight issues.

During the break the facilitators tallied the votes made on the 'Most effective options' in preparation for a discussion of the preliminary findings. At this point the original sector groups were divided to shuffle the participants into two groups of mixed stakeholders. In addition to the standard NGT process, these workshops included a final discussion session aimed at drawing out the benefits of implementing the options that scored the highest in terms of effectiveness. This final discussion only focused on the benefits of the most effective options due to the time constraints associated with completing all the scheduled activities into a single half-day workshop; and also because it provided an additional opportunity for stakeholders (particularly freight operators in this case) to highlight the variety of ways in which each option could be useful if implemented by local authorities. Participants were encouraged to include potential benefits to the local authorities; freight operators; the wider community; and urban areas in general.

Each workshop closed with a final plenary session, where highlights from each group's discussion on potential benefits were shared, and participants were able to add any final thoughts. Finally, at the end of each workshop feedback was sought from the participants with regards to the content and organisation of each event, suggested improvements for future workshops, and finally the recruitment and advertising mechanisms used to attract potential participants.

5.6.5 Workshop evaluation and feedback

An evaluation form at the end of each workshop (see Appendix XI – Workshop Evaluation Form) enabled the participants to feedback their views on the content and general organisation of the event, as well as to provide specific comments regarding their enjoyment of the activities and suggestions for ways to improve future workshops. The second and third workshops included an extra question at the end to help determine which of the recruitment channels used were the most successful at reaching and attracting participants to the events. For each workshop, responses to the evaluation questionnaire were divided into two sub groups: Local authorities and freight industry respondents. The response rate from participants involved was 100%.

In the first section of the evaluation form the participants were asked to rate the statements against a likert scale that ranged from 1 (strongly disagree) to 5 (strongly

agree) to determine the participants thoughts on the general content and organisation of each workshop. For the purposes of calculating the mean responses, these scales were reversed at the time of collating the results to enable a higher mean score to represent a more positive response. Tables showing the distribution of individual responses to the first section from each workshop can be found in Appendix XIII. The second section asked three open-ended general feedback questions that included: '*Which elements of the workshop did you like best? Why?*'; '*which elements of the workshop did you least enjoy? Why?*'; '*How could this workshop be improved and which aspects would you change in future? Why?*'; and additionally, if they would recommend this or a similar workshop to a colleague. These were followed by the fourth question that enabled the participants to provide any further comments or feedback.

As mentioned earlier, the evaluation forms at the second and third workshops included an additional question used to ascertain how the participants at the event had found out about it. At the second workshop all of the freight operators had heard about the workshop through FORS¹, whilst the local authorities had been recruited in a variety of ways, including: Personal email invitations, the South Yorkshire FQP, and ITS (UK). By comparison, the local authorities at the third workshop had all responded to personal email invitations, with the exception of one that had heard about the workshop through ITS (UK). The freight industry participants had either heard about the workshop through FORS or had been forwarded the email advertisement from a colleague.

The findings from these evaluation forms have been used in Chapter seven to help determine the effectiveness of the process created for engaging local authorities and freight stakeholders in collaborative decision making.

5.7 Ethical considerations

Any high quality research that involves human participants requires careful consideration of potential ethical issues, and therefore the avoidance of harm to those people involved. One of the most serious ethical considerations in social science research is the assurance that a participant's involvement is entirely voluntary and that all the potential risks have been made known to them (Berg, 2007). Therefore, in accordance with the University of Leeds ethical guidelines and regulations, approval for this research project was sought from the university's research ethics committee prior

¹ **Freight Operator Recognition Scheme (FORS)** - This is a free, voluntary membership scheme run by Transport for London that aims to improve the delivery of freight in London. It forms part of the wider London Freight Plan, providing the freight industry with a quality and performance benchmark. Its members are offered a wide range of benefits to help them improve performance and cut costs. (TFL, 2010)

to any data being collected. Once ethical approval had been granted, the recruitment of potential participants began.

All potential interview participants were sent an information sheet that outlined the proposed research (Appendix I & VII –Interview and Workshop Information Sheets). This document explained the nature of the research project, the role of the participants involved, and explained potential issues of confidentiality and anonymity. Participants were also able to withdraw from the study at any point and their anonymised responses would be removed from the data set. This was also outlined in the information sheet, and was verbally re-iterated prior to consent forms being signed. In addition, initial invitation letters distributed to all potential participants summarised the content of the information sheet by providing background details to the project and explained that they were being invited to take part in either an interview or a workshop. Potential participants were given a minimum of two weeks to decide whether or not to participate in the research.

Informed consent (in writing) was obtained from each individual that agreed to take part in the study. Berg (2007, p78) defines informed consent as “the knowing consent of individuals to participate as an exercise of their choice, free from any element of fraud, deceit, duress, or similar unfair inducement or manipulation.” For both the interviews and workshops, this was achieved through asking participants to sign a consent form prior to taking part (Appendix IV & VIII – Interview and Workshop Consent Forms). This form contained written statements that requested permission to record the interviews, agreement to take part in a research workshop etc. and to confirm that they understood what was required of them. Participants were free to ask for clarification of the statements in the consent form at any point. Once a consent form had been signed by the participants, each participant received a copy of it for their own records. For each workshop, nobody declined to participate or withdraw during the process. The signed and dated consent forms remained with the main project documents in a secure location in order to maintain the participants’ privacy and confidentiality. Where this data is electronic, the details remain in password protected documents and stored in the university’s secure electronic file store.

The utmost effort has been made to ensure a high degree of confidentiality and anonymity in the reporting of research findings. This includes the removal of names and other characteristics that may make it possible to discover a participant’s identity.

5.8 Risk Assessments

Prior to undertaking any interviews or workshops an Institute for Transport Studies (ITS) risk assessment form (Appendix XII- Risk Assessment form) was completed. This form contains locations, times, dates, means of travel and emergency contact details was signed by my supervisor for each research activity, and a copy filed with the project documents.

5.9 Chapter Summary

This chapter discussed and provided a rationale for the research approach and methods undertaken in this thesis. It began by introducing the interpretivist and qualitative approach which has been adopted, described within the context of logistics research. This was followed by an evaluation of the questionnaire and semi-structured interview methods that comprise the primary research components in stage one of this thesis. Thematic content analysis was also introduced before the chapter went on to discuss the group work techniques that have been considered and implemented in the latter part of the study. The chapter concluded with an outline of the 'Local Authority & Freight Operator Workshops' that were specifically designed for use in this research to tackle the problem of freight stakeholder engagement. The ethical considerations associated with this research along with the required risk assessments have also been considered. Figure 5-3 summarises the research methods used for each stage of the research process and illustrates how the research activities flowed into each other.

This innovative workshop method provides a neutral and engaging environment for public and private sector stakeholders to meet and discuss freight related issues. In addition, the facilitated workshops encourage participants to focus on a particular issue or problem, and work collaboratively to develop potential solutions that seek to benefit multiple stakeholders. The use of the nominal group technique also helps to create an environment where all participants are heard and subsequently each proposed idea is given equal consideration in the discussions that follow.

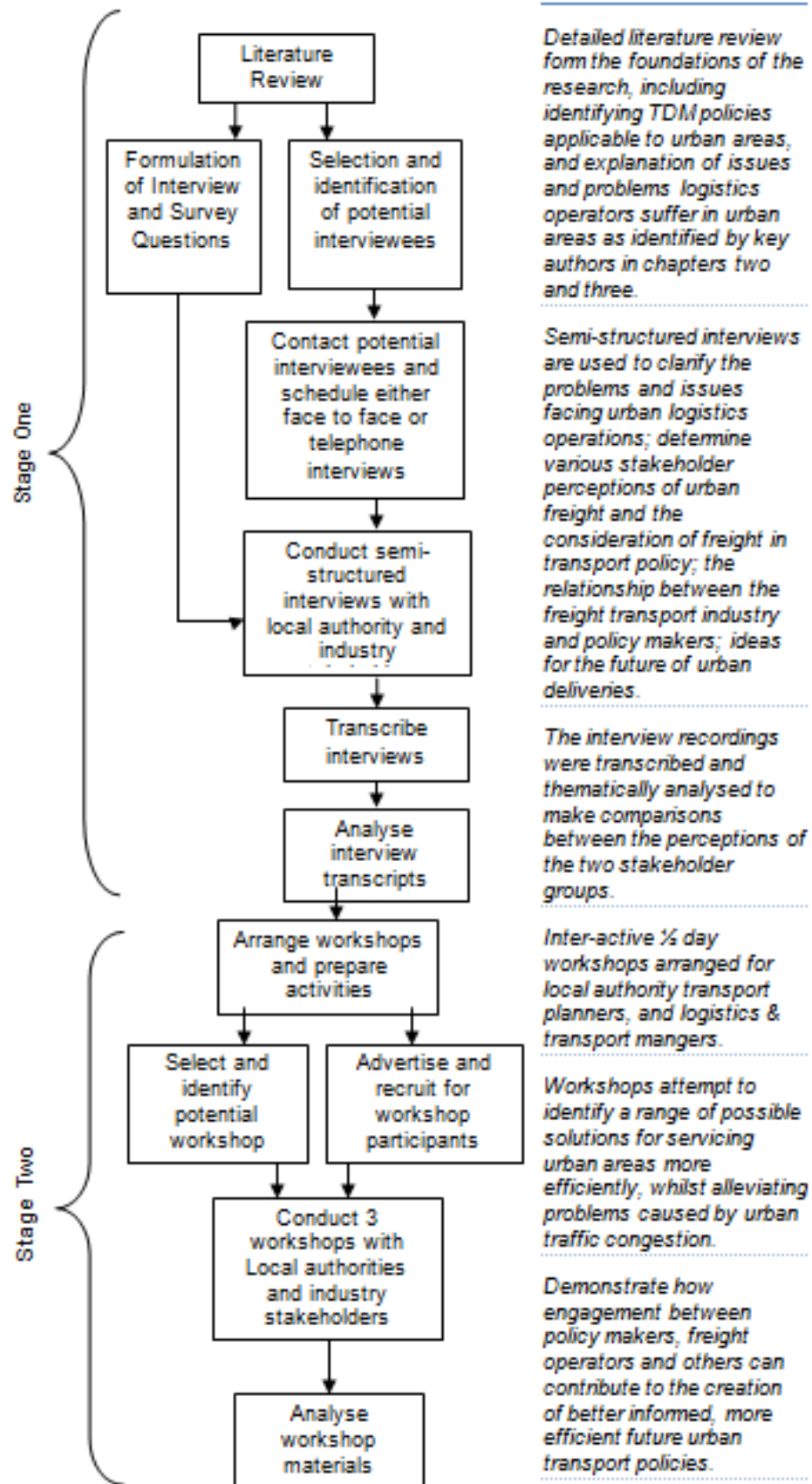


Figure 5-3 Summary of implemented research methods

The facilitated workshops devised in this research therefore provide an innovative method for bringing together a variety of freight and local authority stakeholders to tackle the central problem of insufficient engagement between these parties. The interactive nature of the workshops fosters collaboration between all participants involved, and enables freight stakeholders to become actively involved in contributing to the generation of ideas for potential inclusion in future transport policy. This helps to ensure that policies taken forward to the consultation stages of implementation are less likely to be met with negative reactions from the freight industry.

Finally, Table 5-4 shows how each of the research aims have been met through the chosen research methods, which have been summarised in Figure 5-3. The subsequent chapters six and seven present and discuss the findings from this research.

Stage	Method	Aim 1	Aim 2	Aim 3	Aim 4
1	Pre-interview questionnaire		✓		
1	Semi-structured interviews	✓	✓	✓	
2	Inter-active workshops				✓

Table 5-4 Research aims and methods matrix

6 Chapter Six – Discussion of Interview Findings

6.1 Introduction

Chapter Five explained and justified the methodology applied in this study. This chapter presents a discussion of the findings from the first stage of the research. It comprises of twenty-two semi-structured interviews carried out over a fifteen month period from June 2010 to September 2011. The interviews were conducted in order to compare and contrast current views on urban freight from the perspectives of both local authorities and the freight transport industry. First, details about the sample of participants interviewed will be provided, including a categorisation of the local authorities by type of urban area, and freight operators by industry sector. This is followed in section 6.3 by a summary of findings from the pre-interview questionnaires completed by the participants. Section 6.4 focuses predominantly on the key themes identified from the semi-structured interviews, for which each will be discussed in detail. Finally, these themes are summarised and their implications discussed, thereby setting the stage for the inter-active freight workshops presented in Chapter Seven.

6.2 Sample of participants in Stage One

A total of twelve interviews were conducted with local authorities and ten interviews with representatives from the UK freight transport industry. This sample was selected in order to ensure sufficient coverage of local authorities from a variety of different urban areas, and sufficient logistics and freight operators from a range of industry sectors that frequently conduct their operations in and around urban areas. Table 6-1 provides an overview of key characteristics of the local authorities who participated in a research interview, displayed in order of approximate population size using the mid-2010 population estimates for local authorities in the UK (ONS, 2011) together with the nature of the various urban areas within their remit. Table 6-2 lists the industry organisations that took part in the study, including the industry sectors in which they operate.

Local Authority	Approx Population (2010)	Historic Centre	Port	Market Town in Rural area	Industrial	Major Retail Sector	Major Service Sector activity	Tourism
A	200,000	✓						✓
B	225,000				✓			
C	250,000				✓			
D	275,000		✓		✓			
E	350,000	✓		✓				✓
F	450,000		✓			✓		
G	600,000	✓		✓				✓
H	800,000					✓	✓	
I	1,000,000				✓	✓		
J	1,300,000	✓	✓					✓
K	2,250,000				✓	✓	✓	
L	7,800,000		✓			✓	✓	✓

Table 6-1 Participating local authorities by approximate population size and nature of urban area

Freight Industry Representative	Type of organisation	Industry Sector
1	Local skip provider	Waste management
2	Major supermarket chain	Grocery distribution
3	Specialist temperature controlled courier	Temperature controlled distribution
4	Adviser to freight transport industry	Trade body
5	Major food retailer	Grocery distributor
6	Specialist logistics management firm	Pallet network & general haulage
7	Animal feed manufacturer	Manufacturing
8	Nationwide drinks distributor	Drinks logistics
9	Supplier to builders merchants	Manufacturing and own account distribution
10	Consultant to freight transport industry	Dangerous goods

Table 6-2 Participants representing the freight transport industry by industry sector

Although the interview questions were divided into two sections for the interviews; with the questions in the first section differing between local authorities and industry representatives, the findings in this chapter will be presented on a theme by theme basis. Every local authority interview was conducted in-person, whilst three of the industry practitioners chose to participate in a telephone interview as it was more convenient for them, due to the mobile nature of their role.

6.3 Highlights from the pre-interview questionnaires

As explained in Chapter Five - section 5.4, each stakeholder was asked to complete a pre-interview questionnaire prior to their interview taking place, which would help to use the time spent in the interview more effectively. Two variants of questionnaire were designed, one for the local authority respondents, and another for the freight transport industry respondents (a copy of these questionnaires can be found in Appendix II & III).

The purpose of the questionnaires distributed to local authority representatives was two-fold. Firstly it enabled a basic profile of each interviewee's transport planning background to be compiled in order to ascertain to some degree their level of experience; alongside collecting general information about the local authority, and the transport demand management (TDM) measures and policies currently operating within each local authority's road network, in order to satisfy the second research aim (see Chapter One, section 1.3.1). Secondly the questionnaires helped to prepare each

respondent for their forthcoming interview by allowing them to become familiar with the topics likely to arise in the interview.

The pre-interview questionnaire for the freight transport industry was shorter and used to collect general information about the company's vehicle fleet, the types of business it engages in, the types of urban area they operate in and the frequency of trips to urban areas. This enabled a better understanding of the context of responses from the industry representatives. The highlights of these questionnaires are summarised in the following paragraphs.

6.3.1 Profile of local authority interview participants

The position or role of the individuals representing local authorities' included: Transport and Senior Transport Planners; Transport Policy Officers and Managers; Principal Transportation Engineers; Head of Transportation Strategy; and Head of Transport Policy. Their experience of working in a local authority transport planning department ranged from just one year to twenty years at the time of the interview, with the majority having had between five and ten years experience. Only one local authority respondent was employed in a specifically freight orientated role, two had someone working on a freight oriented role underneath them, whilst the remaining nine had little direct involvement with freight related issues in their current role.

6.3.2 Summary of findings - local authority questionnaire

The local authority pre-interview questionnaire revealed that 'maximizing overall economic competitiveness and productivity' was the most prioritised policy objective. This is perhaps unsurprising given the economic downturn which characterized the period of data collection. The majority of respondents felt they 'understood somewhat' the freight flows in their local area, however over half of those responded believe their local policies are 'neither effective nor ineffective' at supporting freight, which supports Ogden's (1984, p253) premise that urban freight "is rarely the subject of urban transport planning and policy deliberations".

The most commonly occurring Transport Demand Management (TDM) measures and policies in the local authorities interviewed are traffic calming measures (particularly in the inner and outer urban areas, but also appearing in the Central Business District (CBD) in some locations); waiting restrictions found in many CBD's as well as other urban areas; bus lanes; loading restrictions including access time-windows; one-way systems; and vehicle height and weight restrictions. These findings support the general trend towards local authorities implementing largely restrictive policies to mitigate the negatives impacts of urban freight (Danielis et al. 2010). Ogden (1991, p481) reasons that the emphasis on restriction may have arisen from the perception amongst local

authority traffic engineers “that their role is to regulate and restrict a ‘rapacious’ private sector, rather than to assist it to provide goods and services to the community”.

Therefore, it would appear that the policies and measures most commonly implemented are largely restrictive policies to mitigate the negative impacts of freight.

With regards to freight related policies, the main barriers to implementing effective freight policies were identified as including: lack of appropriate data, insufficient operator engagement, and a lack of resources and funding. Respondents were asked to rate the effectiveness, favorability and ease of implementing fourteen freight related TDM policies and measures. There were six options that local authorities responded to most positively, rating them highly on both levels of effectiveness and favorability towards their implementation. These were: urban freight routes, urban freight mapping, dedicated loading bays, repositioning of loading bays, freight specific signage and encouraging local sourcing. However, despite being rated highly for effectiveness and favorability, only freight specific signage was deemed easy to implement. With the exception of local sourcing, all of the highly rated options are ways of managing or restricting freight movements.

The final section asked local authorities questions regarding the consideration of an Urban Consolidation Centre (UCC) in their area. Of the twelve local authorities interviewed, nine reported that an UCC had been considered for their local area, with the most popular objectives for an UCC being to: reduce carbon footprint, improve urban freight distribution, improve air quality, and reduce urban congestion. However, it should be noted that the objective of reducing traffic congestion does not necessarily align with improving freight operations. The main issues cited for not establishing an UCC, were funding and user uptake, which corresponds to the findings of Browne et al. (2007b) who discuss the lessons learned from existing and attempted UCC’s. However, as Rooijen and Quak (2009) point out many logistics operators will still prefer to supply retail stores directly, eliminating the need for an UCC, regardless of any policy restrictions in place to encourage their use.

6.3.3 Profile of industry interview participants

The industry representatives interviewed included: company directors; transport managers; and operations managers from the UK logistics and transport industry.

Overall, their experience of working in the transport and logistics industry varied greatly from five years to more than thirty-five years.

6.3.4 Summary of findings - freight industry questionnaire

The second section of the questionnaire asked respondents to identify their organisation’s area of core business and the industry sectors in which they operate.

Table 6-2 lists the nature of the organisations interviewed and their primary industry sector in which they operate. Amongst the companies interviewed, transportation of foodstuffs was the most commonly carried product type.

Of the companies interviewed, rigid and articulated HGV's and vehicles with a curtain-side were the most commonly used, as shown in Figure 6-1; with the number of vehicles in each company's fleet ranged between zero and 1700.

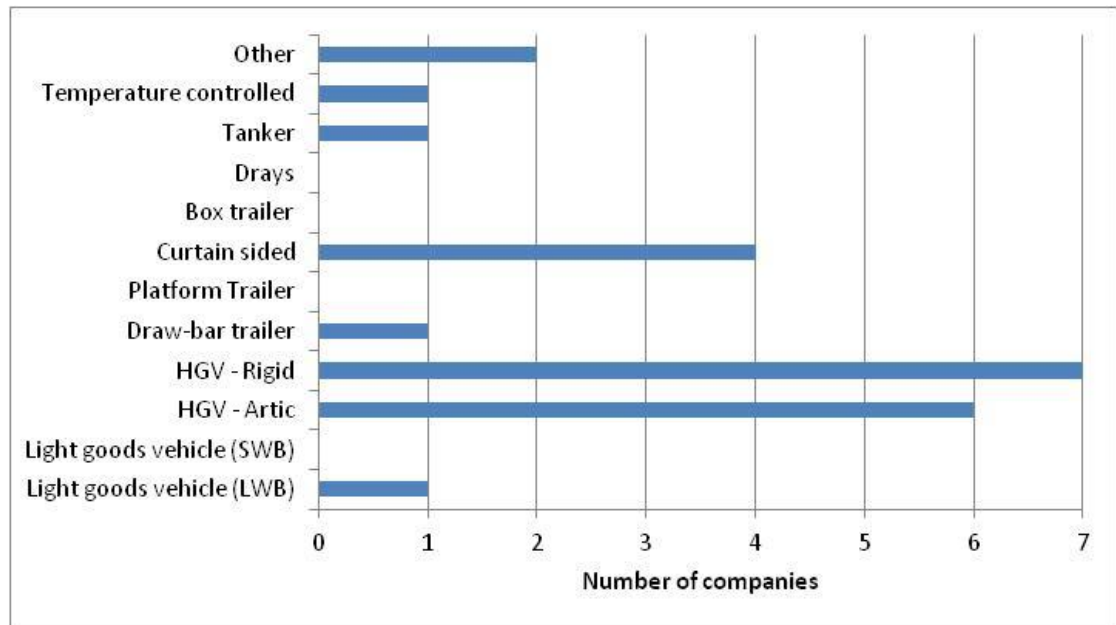


Figure 6-1 Vehicle fleet composition of companies interviewed

The third section of the pre-interview questionnaire focused on the urban logistics operations of the companies interviewed. Firstly the types of location where vehicles currently operate shown in Figure 6-2, which has highlighted that the majority of companies vehicles operate across a variety of locations from the CBD and inner urban areas to as far out as rural locations, which implies that urban policies incorporating freight logistics are only part of the picture. The second question relating to urban logistics identified that for most of the companies interviewed, vehicles make numerous visits per day into town and city centre locations (Figure 6-3).

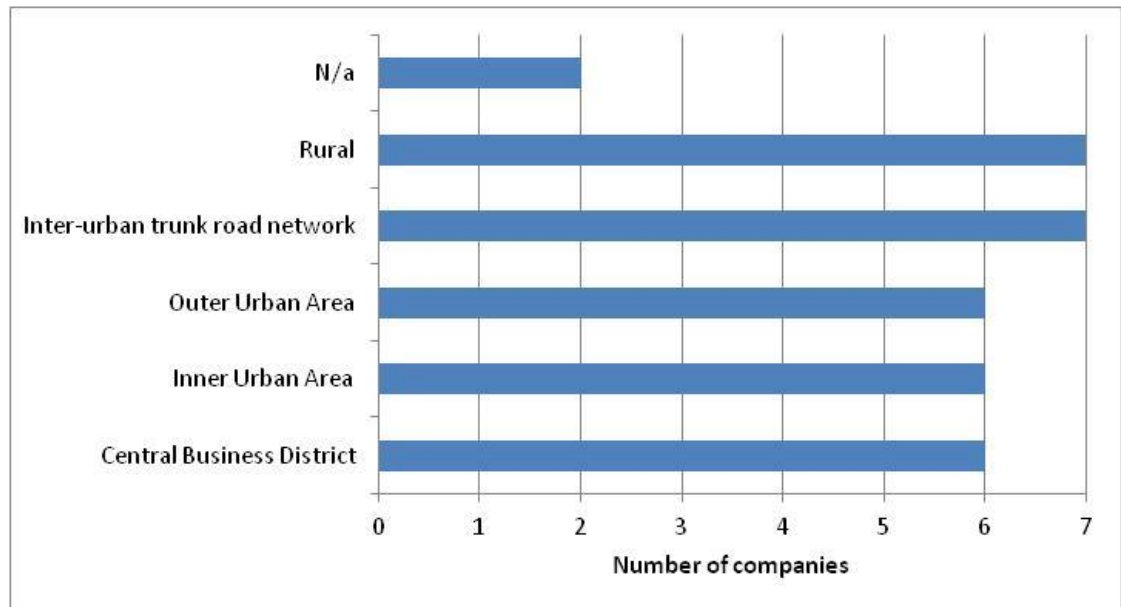


Figure 6-2 Locations in which the vehicles of the companies interviewed operated

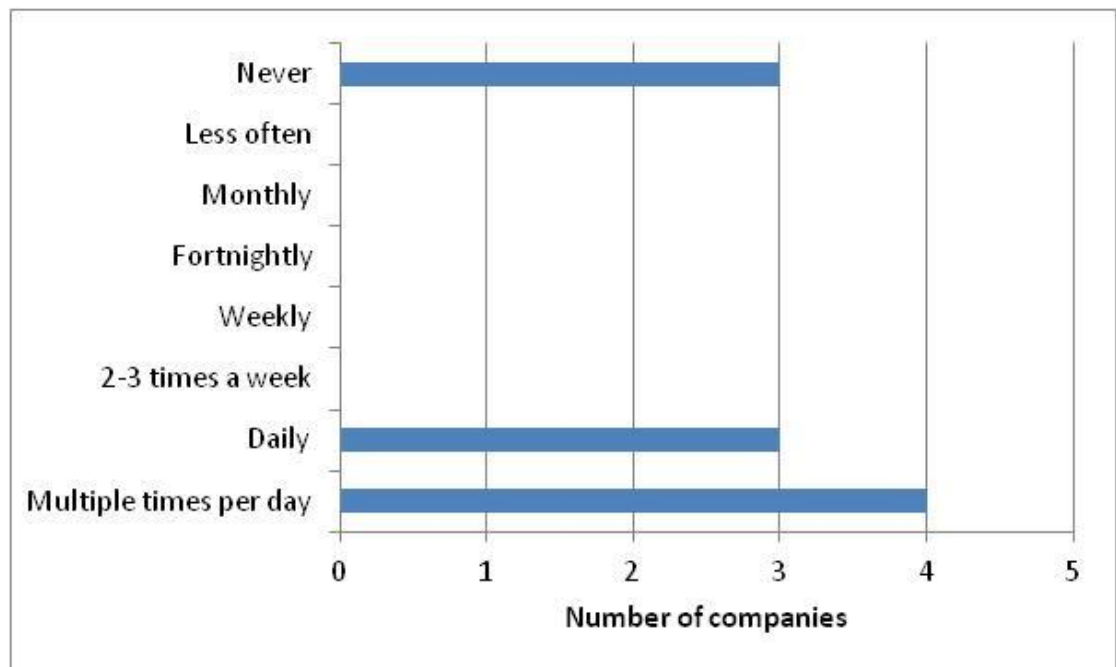


Figure 6-3 Frequency of visits to town and city centre's of vehicles belonging to companies interviewed

It is important to note that the freight industry questionnaire does not include an assessment of urban transport demand management measures and policies. This is because the objective for the questionnaire, as explained in section 6.2, differed between the two main stakeholder groups, and was kept brief in an effort to avoid losing participants from a notoriously hard sector to recruit.

6.4 Key themes from interviews

6.4.1 Understanding of urban freight flows

The interviews conducted with local authorities confirmed that there is a general lack of knowledge and understanding of freight transport operations amongst local transport planners. This stems from a lack of freight transport expertise, which is in part due to local authorities being admittedly “light on staff and technical expertise”, as well as a scarcity of financial resources to subcontract work to consultants in the private sector.

The majority of local authorities interviewed confessed to relying on private sector consultants to conduct freight related scoping and feasibility studies. Many also mentioned commissioning independent experts in the private sector to produce reports in support of their Local Transport Plans and City Region Transport Strategies. Some local authorities looked to a neighboring authority for guidance on freight related matters, although this usually occurred where one authority employs an individual with some background in freight operations. Alternatively, other local authorities approached a regional strategy team that includes people with a specific responsibility for freight to help them deal with any freight issues that arise.

Out of all twelve local authorities interviewed, only three were confident in their ability to manage local freight movements. Of these, one has a transport planner with previous experience working in the logistics industry, who as a result had become the region’s central resource for freight related queries. Another local authority had an officer who was heavily involved in organizing their local freight quality partnership (FQP) and a freight steering group. In addition this same officer was responsible for coordinating representatives from the local freight industry to assist with the development of freight related policies and initiatives in the area. Whilst the third local authority is supported by a dedicated freight team confident in their ability to manage freight movements. However, there is no single distinguishing feature that is shared amongst these three local authorities, and therefore little evidence to suggest any correlation between the level of local authority confidence in managing urban freight and the nature of the urban area.

The level of knowledge that authorities have of urban freight flows varies from one area to another. In some places authorities report having very little knowledge of freight movements in their area aside from knowing of its existence, whilst more than half of the authorities interviewed report being rather well informed of local freight movements. Those better informed authorities appear to have a good understanding of the freight industry in their geographical area; however this is mainly derived from their own local knowledge rather than from quantifiable data sources.

Despite what at first appears to be a detailed in-depth knowledge of freight activities in their area, the authorities' understanding seems to be limited to knowledge of industrial estate locations and land dedicated to logistics and warehousing activities, and some basic port traffic flows due to good relations with port operators. In some cases, popular routes travelled by HGV's are also known, but that is usually due to either issues or complaints raised by local residents or the authority having become involved in mapping and signing HGV routes in and around the area. Data held by the authorities on local urban freight movements is also minimal, and in some places there is no data that directly relates to freight. Generally the authorities have no real idea of the volumes of freight or the different types of commodities that are being moved through their area, with the exception of the few authorities interviewed whose area is home to quarrying, mining and timber industries; and the major ports.

Less than half of the authorities interviewed claimed to have some data on freight. In at least two cases their data was sourced from consultants that had been contracted to work on drafting a freight strategy. The main focus of this data was HGV statistics highlighting freight modal share by road in the area and percentages of HGV trips taking place in the area. Other data sources included the Freight Operator Recognition Scheme (FORS)² and Eco-Stars schemes³, which provide the authorities behind them with performance data on HGV trip origins and destinations, profiles of company fleets, fuel usage, CO₂ emissions and collisions. Some authorities have conducted small scale HGV traffic surveys; however this data was collected for and used in conjunction with specific problems raised, such as the public's perception that there is too much HGV traffic coming through some of the smaller market towns. Other surveys of HGV's relate to scoping the viability of major infrastructure improvements to the network, and relate to proposals for new lorry park provisions, although it is common for consultants to be commissioned to carry out these surveys and provide the data. In general, where data is collected, its focus is on quantifying freight traffic rather than identifying what role it plays in servicing the town, city or surrounding area.

² **Freight Operator Recognition Scheme (FORS)** - This is a free, voluntary membership scheme run by Transport for London that aims to improve the delivery of freight in London. It forms part of the wider London Freight Plan, providing the freight industry with a quality and performance benchmark. Its members are offered a wide range of benefits to help them improve performance and cut costs. (TFL, 2010)

³ **Eco Stars Fleet Recognition Scheme** - A South Yorkshire wide scheme, for which membership is free and voluntary. It provides each member with tailor-made support for their fleet, to help it operate more efficiently and economically. The scheme aims to help improve fuel efficiency, minimize operating costs, and reduce emissions. (Care4air, 2010)

6.4.2 Recognition of freight transport in urban areas

Since the government recognises freight transport as one of the key drivers of the urban economy, it is therefore a requirement that authorities address freight issues in their local transport plans (DETR, 2000). However, despite the apparent importance given to freight as a facilitator of economic growth, the planned development measures outlined in those same transport plans are rarely directly related to freight transport. Where they have a direct influence on freight movements, they generally concern restrictions and regulations aimed at minimizing noise and air pollution, or preventing heavy vehicles from intruding into the pedestrian environment (e.g. from damaging pavements). The reason for freight being included in this manner could be as suggested by one interviewee, down to the fact that most local authorities really only acknowledge freight when they receive complaints about it. Common complaints relate to issues surrounding noise, safety and access, for example transport operators generally complain about the availability of and access to loading/unloading space.

6.4.2.1 The contribution of urban freight to the economy

All of those interviewed (from both local authorities and the freight transport industry) agreed that freight has a very important role to play in supporting the urban economy. For example, authorities whose geographical areas encompasses a port emphasized particularly strongly the employment opportunities that logistics service industries provide, such as warehousing and port operatives, explaining that “Various people have come up with figures for the amount of jobs associated with the port, something like 20,000 indirect jobs”. For some of the other authorities interviewed, freight has a significant part in supporting their regions’ quarrying, timber and agricultural activities, where it provides a continuous source of employment, particularly in rural areas. Even in places where the economy is dominated by the service sector, such as those reliant on regular tourism, the local authority recognizes that for “the tourists that come here to buy the ice creams, the ice cream has got to get here...it probably came on a lorry.” Local authorities in areas which were dominated by coal mining and industrial manufacturing during the latter part of the twentieth century also identified urban freight as being “key to successful regeneration of the region”.

In comparison, the industry representatives interviewed focused more on the vital service that freight transport provides in terms of supplying goods to consumers, retailers and the construction industry. The wider economic significance of their operations was not highlighted during the interviews. From the operators’ perspective it would appear that local authorities “see the potential in using the [distribution] industry as a very lucrative revenue stream” as opposed to recognizing the freight transport industry as a facilitator of commerce and valuing the service they provide.

Two of the freight operators interviewed noted that in the UK, the “government generates an awful lot of revenue through the freight industry, particularly from fuel duty.” The London Congestion Charging Scheme was also mentioned by some as another major source of revenue for public funds. According to Transport for London (2008) the freight industry contributes an estimated £37 million per year in revenue from daily fleet vehicle charges, as well as contributing towards income from penalty charge notices (PCN’s) for violating parking restrictions in the city. In 2012, a survey of twenty six members of the Freight Transport Association (FTA) revealed that during the period of Q1 2009 to Q2 2011, over 80,000 PCN’s had been issued for violating parking restrictions in Central London. In total, London Councils’ will have received £3.86 million in revenue from PCN’s in that period alone (Chapman, 2012). The operators appear to question whether they get good value back from the money they spend.

6.4.2.2 Public and political recognition of urban freight

Most of the local authority representatives interviewed believe that the general public take the services provided by freight for granted, and therefore issues relating to urban freight do not feature high on the political voting agenda. Therefore, as one local authority pointed out, if freight “is not on the politicians’ radar...it won’t become an issue for the officers to address.” Despite the influential role of local politicians in the community, it was felt by both stakeholder groups that they have little regard or support for freight based issues and initiatives. One authority explained that in order “to firm policies up, you’ve got to have political support...and they don’t see the big picture”. This view was echoed by one of the freight operators who commented that the politicians “like to think it’s important but I’m not sure that a lot of politicians give it the attention it deserves”.

Despite a fairly clear understanding of the ways in which freight positively contributes to the urban economy, the authorities suggested that in general their views are not shared by the public, who are often unaware of the role freight has in supporting their local economy. One of the operators interviewed remarked that “I don’t think people see it as an important role, I don’t think people realize how things get from A to B.” other industry representatives also highlighted a low level of knowledge about urban freight amongst the general public, and hence they place “very little importance on it”. There was consensus amongst those interviewed that the general public’s lack of knowledge and or interest in the freight movements occurring around them had led to a raised profile of the negative aspects of freight transport. In support of this, one industry respondent commented that in the eyes of the general public, freight is “most probably misunderstood more than anything. I think when any individual goes to their corner

store they're happy to pick up their loaf of bread but they're pretty [annoyed] that they can't park their vehicle...because the [delivery] truck is in the way," which highlights that people "want the convenience but they don't want the inconvenience of vehicles being in the inner cities or built up areas at the times when they are trying to go about their daily business."

The interviews with local authorities also highlighted the increasing conflict of desires between freight operator demands for improvements to policies and the road network, and the general public's demand for measures to restrict lorry movements in and around their local area. This was particularly evident in areas where freight regularly passes through rural villages and market towns, where locals argue that HGV's spoil the rural idyll. Four of the local authorities interviewed identified the challenge of convincing locals that freight is important, despite the majority of freight being through-traffic that does not have a direct benefit. One local authority admitted that "big lorries are not liked; but perhaps we [the local authority] could do more to show how useful logistics firms and lorries are for the economy, so they can be seen in a more positive light."

6.4.3 The relationship between local authorities and urban freight stakeholders

6.4.3.1 Current levels of engagement between stakeholders

The interviews revealed a distinct lack of engagement between local authorities and the freight industry. One local authority attributed the departure of their designated 'Freight Officer' for their lack of communication and engagement with local commerce and industry, which had also contributed to the decline of their FQP.

The most common type of involvement reported between stakeholder groups is "on an ad hoc basis when there is something that needs to be addressed." Such issues may come from members of the general public who are concerned about levels of safety and noise disturbance near their homes, or from transport operators themselves regarding difficulties accessing loading areas. Dependent on the level of severity, these complaints sometimes escalate into stakeholder consultations aimed at solving a particular issue or problem that has occurred in the urban area. However, the majority of industry respondents interviewed felt that their current level of involvement with local authorities is either very little or nonexistent. Where contact had been experienced it was noted as being very limited and one of the main issues raised was the difficulty getting an appointment with local authorities. Only two industry respondents mentioned being in discussions with local authority town planners (usually based in a different department to transport planners) regarding planning permissions for developing new

sites. However it was noted that councils preferred to meet with consultants rather than the company.

From the local authority interviews only a few exceptions arose to the pattern of limited engagement with industry. For example, one authority at the time of interviewing was actively contacting town centre retailers regarding proposals to establish an urban freight consolidation centre, and was in the process of discussing these plans with a third party logistics provider to help set up and manage the project. The authority aims to develop an urban consolidation centre to help reduce the town's carbon footprint; improve air quality; reduce traffic congestion in the town centre; and increase retail vitality, although at this time the proposals have not developed beyond the initial ideas phase. Another local authority uses its involvement with the FORS scheme to engage with member freight operators. This has provided opportunities to promote awareness of campaigns such as 'HGV Cycle Safety', e-learning opportunities and training specifically tailored for freight operators.

6.4.3.2 The influence of freight stakeholders on policy selection

Outside of the current Local Transport Planning (LTP) process, which is explained in Chapter Three, there is little engagement between the freight industry and local authorities. When asked specifically about communicating with individual freight transport operators, one authority replied "we have had a dialogue with specific companies but only to really answer specific concerns that they have. We have not really been proactive in engaging with specific companies." In some instances local authorities even admitted that they could be more proactive in engaging with the private sector.

Although individual companies are rarely consulted, most authorities make the effort to invite trade associations, namely the Freight Transport Association (FTA) and the Road Haulage Association (RHA) to consult on behalf of their members during the LTP process. This strategy is perhaps not surprising as there are hundreds of freight operators that could potentially be included in a consultation, and therefore a large proportion of local authorities interviewed exhibited a preference to engage with them through the relevant industry bodies (i.e. the FTA and RHA). However, only half of the local authorities interviewed actually reported a good working relationship with the FTA and RHA. Many of the authorities interviewed mentioned a desire for more interaction with the trade associations and would like them to get on board and support the authority's policies.

It would appear that some authorities consider that the recent demise of the regions by the current coalition government is responsible for their lack of interaction with the

trade associations, as previously regional meetings had been well attended by representatives from the FTA and RHA. With the majority of freight trips crossing local authority boundaries, but remaining within the planning region, it may be more sensible for local authorities to pool their resources and plan for freight on a regional basis, but this could now be difficult for authorities to organize in a formal setting now that regional development agencies and regional government offices no longer exist. Other authorities link their lost communication with the trade associations to the drop in meeting frequency of their local or regional Freight Quality Partnership (FQP) that in some places as one respondent explained have “sort of fizzled out over the last couple of years”.

Nearly all of the authorities interviewed also regularly attend local Chamber of Commerce meetings to engage with private sector stakeholders. In particular, local authorities were keen to attend transport themed meetings, which provide the opportunity to discuss the views and perspectives of their business stakeholders on issues that need to be addressed and to get feedback on draft policy proposals. These same authorities who attended Chamber of Commerce meetings also believed that active involvement in Local Strategic Partnership meetings is important. However, one authority reported a previous negative experience from engaging with individual freight transport companies, which has meant they no longer approach the private sector for their input on policies. The authority distributed questionnaires to companies in the surrounding area with the aim of gathering feedback on the possible impacts and effects that a proposed road pricing scheme may have on local businesses and their operations. Unfortunately, the authority felt that the responses they received lacked sufficient detail compared to what had been sought, and concluded that in general the private sector organizations approached had failed to identify the potential costs and benefits of road pricing to their business.

Some authorities may still lack direct engagement with the freight transport industry on policy selection. However to compensate for the gap in communication, four local authorities interviewed mentioned that they had recently recruited individuals with either experience in one of the trade associations (FTA or RHA) or from the road haulage industry. It is hoped that these individuals will foster a strong relationship with the FTA and RHA on behalf of the authority, in addition to establishing a large network of new contacts for the authority to liaise with.

6.4.3.3 The use of FQP's to engage with freight stakeholders

The best recognized example of regular stakeholder involvement with local policy makers is Freight Quality Partnerships (FQP's) in the UK (Allen et al, 2010). However,

despite encouragement from the UK government for local authorities to use FQP's to meet with businesses, freight operators and other stakeholders to address freight transport issues, the interviews with both local authorities and freight industry representatives clearly indicate that they are currently under-utilized as a mechanism for engagement.

Of the local authorities interviewed, only one half had any sort of FQP or similar forum in active use. The remaining half were either in the process of setting up a new FQP; trying to revitalize a dormant FQP; or admitted their limited expertise on freight and hence their decision to leave the organizing of such groups to a neighbouring local authority. In some cases an FQP had been established around 2004/2005 as part of a consultation process for the formulation of the second local transport plan ('LTP 2'), but many were deemed unsuccessful and had since disbanded. Reasons for this included: a perceived lack of interest from local freight stakeholders (although this could be due to local authorities' reactive nature to engagement opportunities); difficulty in arranging mutually convenient meetings; an insufficient number of issues to be addressed or issues that local authorities considered to be too minor for an FQP to deal with.

In some places the local authorities were engaging with industry stakeholders through specific industry sector themed FQP meetings. This type of FQP was prevalent in areas where freight transport has a significant role in supporting local industry, such as shipping and port activities, quarrying or forestry. Local authorities reported that themed meetings were particularly useful to discuss issues arising from the routes used by commercial vehicles.

Only three industry representatives interviewed were aware of FQP's, and only two of those had received an invitation to attend an FQP meeting. The other industry representatives were asked what they knew about FQP's, to which three responded that they had never heard of them. Although once explained in the interview these respondents expressed an interest in attending a future FQP meeting.

6.4.3.4 The role of industry trade associations in influencing transport policy

Industry trade associations are responsible for representing their members' interests and voicing their concerns. Quite often these organisations are the main point of contact with local authorities on behalf of their members. In the UK, the Freight Transport Association (FTA) is one of the largest trade associations, along with the Road Haulage Association (RHA). Both organisations regularly meet with their members to discuss current legislation and ensure that through steering groups, companies can air their opinions about proposed national transport policies. In addition, they are also responsible for attending and representing its members at FQP meetings.

Of the companies interviewed, two were members of both the FTA and RHA, four were FTA members, two were RHA members and some were not members of either organisation. All the industry representatives were asked to rate how effective they thought organisations such as the RHA and FTA are at influencing transport policy on their behalf. Their overall response was favourable, with the majority believing that these organizations do a good job of influencing national policy that has an effect of a large proportion of their members, as opposed to the smaller more localised issues, which tend to be location specific. On the whole, respondents felt that these organisations were best at voicing the concerns of hauliers and raising awareness of operational issues, such as the national campaign for Fair Fuel UK.

6.4.3.5 Opportunities for future engagement between stakeholders

Despite many local authorities' limited knowledge and awareness of urban freight, as was discussed in section 6.4.1, it would seem that it has become an area of increasing interest for them. Interaction between the freight industry and local authorities can be beneficial, especially if it provides the opportunity for operators to discuss particular transport issues and be informed of changes to current transport policies in the area. On the whole, the freight operators interviewed welcome the higher level of awareness of urban freight movements and were generally encouraging of local authorities getting more actively involved. Although some concerns were raised over the risk of their operations becoming more inefficient as local authorities become more aware of freight movements, which could lead to more restrictions being applied.

In the interviews, freight transport operators discussed ways in which their industry could become more engaged with local authorities in the future. They suggested that the government needs to assist their industry more by promoting the benefits of freight and raising awareness amongst the general public of the costs involved in transporting products around. Another suggestion involved re-formatting the consultation process to make engagement with freight operators a formal part of the process and to improve the selection of people invited to take part in consultations. In addition it was noted that, with trade bodies such as the FTA and RHA at the forefront of current communications with the government and local authorities, the creation or promotion of existing forums and consultations is still required to bring both parties closer together. Although some operators didn't have anything to suggest, they did agree that joint industry and government forums had the potential to be quite useful in the future. It therefore presents something of a conundrum that both local authorities and operators can see the potential benefits of closer engagement but have thus far failed to stimulate many such meaningful on-going engagements.

Despite most of the local authorities interviewed agreeing that there was potential for more active engagement with the freight industry, one respondent pointed out that “the private sector [is] probably the hardest to reach, because by the very nature there are a lot of small operators...who are often two man bands who don’t have a lot of time to send people to meetings, they work around the clock. When you do get them, the small operators tend to have very localised, specific problems.” In contrast, the authority pointed out that “the bigger operators are much easier to reach because they will have a dedicated officer whose job it is to talk to people and they will have more global problems, which are probably easier or more meaningful to get to grips with.”

6.4.4 The main problems associated with urban freight operations

All of the stakeholders interviewed were asked to discuss the main issues relating to and resulting from urban freight operations. For the local authorities, the questions focused on identifying the greatest impediments to logistics operations in their urban areas, and highlighting which policies in their opinion had caused the most positive and negative impacts on freight operations.

6.4.4.1 The impact of urban freight on air quality and traffic congestion

There is growing concern about the negative impacts on public health of air pollution in the UK, Europe and elsewhere, to the extent that in the UK air quality monitoring (and policy action when permissible pollution levels are exceeded) has become a statutory requirement of local authorities. It is therefore unsurprising that the interviews highlighted meeting air quality targets as a major area of concern for local authorities.

In response to concerns about air quality, a few of the industry respondents interviewed remarked on the huge strides taken by industry over the last 15 years to reduce truck emission levels, and over that period the transition from Euro I to Euro V standard trucks which has considerably improved pollution levels. In addition, some of the industry respondents commented that the encouragement of electric vehicle technology and the introduction of low emission zones (such as the London LEZ discussed in Chapter Two Section 2.4.4) have been a good way of forcing companies to look at new technologies, and to update their fleets with more economical and environmentally friendly vehicles. However, one local authority reported that exhaust emissions from commercial freight vehicles are perceived as a major contributor to poor air quality, and in some places local residents believe that “lorries are killing them, causing pollution and cancers”. As a result, some authorities feel much more needs to be done to alter the public’s perception of freight, and to help them understand the value of freight in the economy.

One of the main issues identified by local authorities is the rising traffic congestion, which can hinder urban freight movements and operation. This is particularly noticeable in larger cities such as Sheffield, where the urban centre forms part of a much larger urban conurbation within South Yorkshire. Such high levels of urban congestion can hamper efficient delivery operations and cause significant delays. Rising congestion on the main trunk roads that provide access into urban areas was also recognised as being a threat to the local economy. The port cities felt most strongly about the effects that rapid traffic growth is having on their local economy. They recognised a need to try and address worsening journey time reliability caused by urban traffic congestion if they are to keep businesses from moving out of the area. In addition, a couple of the authorities advised that the possibility of encouraging night-time deliveries or off-peak deliveries would not always provide a practical solution to avoiding congestion, as city centres may have a high residential population who would likely oppose such activities due to the associated noise disturbance.

From the interviews with the freight transport operators, high levels of traffic congestion remain a considerable problem, as hold-ups and delays result in late or even missed deliveries. Traffic congestion also has a significant influence in delivery scheduling and route planning, and is sometimes a factor in deciding whether or not to split a full load onto multiple vehicles. Although local authorities are aware of congestion, none of them stated that the use of multiple vehicles by logistics and freight operators was having an impact of congestion (although this may be a result of ignorance of freight planning processes). Operators also explained that the majority of freight being distributed in and around urban areas usually begins its journey at a regional (and sometimes national) distribution centre, which tend to be located close to the motorway network. This means that any major incidents on the motorway or severe traffic congestion can impact the delivery schedule. Such delays can cause city centre delivery time windows to be missed, often resulting in either a failed delivery, or forcing operators to park a significant distance from their delivery point (either to avoid a parking penalty charge notice (PCN), or to avoid getting stuck in a CBD when the access time-window closes) which compounds an already delayed schedule.

6.4.4.2 Impediments to urban freight operations

In the majority of urban areas local authorities manage freight transport through a combination of regulations and restrictions. From the operators' perspective, the most significant impediments to urban freight operations can be grouped under four key themes: access to delivery points, parking restrictions, delivery times, and vehicle restrictions.

At least three local authorities identified shortcomings with current delivery access to high street shops. These included a lack of rear access to premises and limited availability of on street loading facilities. Operators working at a national level said this was a particular issue in Central London. Also observed were impediments resulting from limitations of urban street geography, in particular historical and 1960's street patterns, which can make navigating a lorry very difficult in places. This is particularly true for cities with a historic core. One local authority talked about the difficulty delivering into their historic centre, remarking that "the streets are narrow and if you've got one lorry parked, you can't get another one past." Some of the operators also pointed out that a lot of urban deliveries are made to premises that have undergone a change of use, and hence may not have purpose built loading/unloading facilities that suit the current occupiers. For example, as one operator explained, what may once have been a hairdressing shop on a high street in the 1960's, may have since been converted into a small convenience store, and therefore access to the store is limited because it had never previously been required.

With regards to parking restrictions, local authorities are very restrictive, and operators frequently mentioned the inadequate provision of loading/unloading facilities as an impediment to their operations. In particular, operators noted limited availability of loading bays close to pedestrian precincts as these areas often have short time windows to make deliveries. A temperature controlled courier gave an example of the difficulties sometimes faced when making time sensitive deliveries to urban centres, "We had some sandwich deliveries to [a store] in a pedestrianised zone, which arrived 10 minutes too late and couldn't [gain access]...we found somewhere to park up, about a 10-15 minute walk away... would you be happy buying a sandwich from a store that you knew had been out of the fridge for 10-15 minutes?" This example highlights the poor loading facilities in many urban areas that four of the industry respondents highlighted, and commonly lead to PCN's. For companies that operate in Central London, PCN's and tight loading restrictions are "a regular thing" to contend with, and have been described by operators as "the one big thorn in our side".

PCN's are frequently received by operators engaged in city centre deliveries to commercial premises such as offices, restaurants and pharmacies where there is often a significant lack of adequate loading / unloading facilities nearby. This apparent scarcity of facilities combined with strict enforcement of loading periods by local authorities may encourage operators to send more delivery vehicles than is necessary into the urban area (i.e. two potentially part-loaded vehicles, or multiple smaller vehicles), in an effort to speed up unloading and complete deliveries within a specified time period. Whilst this may avoid PCN's being issued it does mean that companies

are faced with the cost of running more vehicles than is necessary and each operating under vehicle-fill capacity, which is operationally inefficient. At the same time, local authorities are failing to achieve their objective of reducing the number of vehicles operating in urban areas.

However, a few of the operators interviewed felt that some local authorities were unfairly issuing parking tickets to commercial goods vehicles; with over-staying their allotted time period in designated loading bays being the most commonly cited reason for receiving a ticket. One industry respondent even declared that their vehicles are repeatedly fined for staying too long in a loading bay when making deliveries to a customer whose premises are situated in the middle of a pedestrian precinct, and over a five minute walk away from the closest loading bay. While another respondent recounted a similar experience and expressed that “it doesn’t make sense to give a chap a ticket for overstaying his forty minutes unloading period...because he can’t do it in less than fifty [minutes]”.

There was a general consensus amongst the industry representatives that city centre parking regulations are too strict, particularly for milk-round style drop-off deliveries (such as parcel couriers), and that more leniency should be applied in cases where appropriate parking is seldom available. Operators also mentioned that some cities were more lenient than others with regard to issuing parking tickets, and therefore it was felt that greater consistency was needed across the board. Where an operator whose core business involves visiting residential properties in restricted parking zones, for example to install a utility service, some interviewees thought that they should be given more leeway, with “something set in place where they are not penalised to the extent that they are”. Furthermore, unauthorized parking of cars in loading bays was highlighted by many of the interviewees as hindering efficient freight transport operations. Often delivery vehicles are penalized for parking inappropriately on double yellow lines or blocking an access road which otherwise wouldn’t have happened if cars hadn’t been illegally parked in the loading bay area.

The remaining issues that are discussed in this section as impediments to urban freight operations showed little overlap with those identified by the local authority planners.

Delivery time-window policies are one of the most commonly used demand management tools for regulating urban freight movements. In a survey of thirty-three Dutch local authorities, Quak and de Koster (2006) highlighted that over 90% of officials sought to implement time-windows with the main objective of creating a more appealing shopping environment, in order to attract more visitors and enhance local

economic development. However, the operators interviewed described the operational pitfalls of such policies.

Restricted delivery times were also reported to cause problems in some areas. A major grocery distributor explained how delivery restrictions imposed on a new convenience store by a local council in South East London impacted on their business, "We can have deliveries after 9.30am and then up until 4pm...That gives us problems such that we couldn't deliver newspapers or milk in the morning; it was a bit too strict". Such restrictions result in less than optimal delivery alternatives. In this particular case an exemption for smaller vehicles to deliver between 7am and 9.30am was granted, however this results in a higher number of vehicles being used than is necessary to service a store, which is uneconomic as well as being potentially more polluting and adding to urban traffic congestion.

Some hauliers who are members of a pallet network noted that they make their deliveries within a specific postcode area where freight comes in overnight and have a short turn-around time to ensure next day delivery within a specific time window. City centre pedestrian precincts were highlighted as being particularly difficult areas to operate in, although operators recognise that it can be a balancing act for local authorities between the needs of operators and the safety of pedestrians. However, with growing regeneration and city centre developments the volumes of freight being delivered here are on the increase. From a business perspective, hauliers would rather have deliveries split across the day and use vehicles multiple times to get the maximum utilisation of hours on the road.

The final key problem raised by operators was the issue of vehicle restrictions, both in terms of councils restricting the size and type of vehicle able to enter a designated area (as described earlier with regards to early morning shop deliveries); and entire bans in some places, which can all have negative impacts on the supply chain. For example, the London Lorry Control Scheme imposed in the 1980's, before the M25 motorway was constructed (which now acts as an orbital route that avoids Central London), is now considered by operators as out of date and no longer necessary. One interviewee pointed out that "no driver in his right mind would go through London when he can put his cruise control on and go similar mileage at 50-56mph without any interruptions...a lorry that is coming into London now is coming in to make a useful delivery...that is far quieter and far less polluting than it was thirty years ago." Seasonal blanket operating bans that completely halt essential services for periods of time, which are enforced by some councils, also appear too strict. For example, a waste management operation reported that in "the run up to the Christmas period, they'll not allow us to place

containers in certain street areas...because of the projected Christmas shopping”. Similarly, a leading grocery distributor explained how bank holiday delivery bans heavily impact their supply chain. “It’s a problem we have at Easter, where you’re not able to deliver for four days to a store and can’t put milk into it”.

Interestingly, none of the operators interviewed mentioned traffic congestion as being an impediment to urban delivery operations. This may well be due to the fact that most operators have learned to live with the inevitability of congestion, and factor expected traffic congestion and slower speeds into their route planning software and hence amend their delivery schedules as required. It could also be due to the perception of those operators directly involved with freight movement that “they cannot influence the efficiency of the [transportation] system or choose not to spend time influencing it” (Goettee and Cadotte, 1977, p40 as cited by Ogden, 1992, p80). Reasons for this may include: such problems may occur intermittently so are therefore accepted as a temporary inconvenience; or businesses may be unaware that action can be taken; or operators may not want to draw attention to themselves and their problems that could attract negative publicity (ibid). However, operators did identify a significant lack of suitable lorry parking in and around large urban conurbations, an issue which has become more problematic following the introduction of Drivers’ working hours legislation in the European Union in April 2007. For which EC regulation 561/2006 states that after a period of four-and-a-half hours driving time, a driver must take an uninterrupted 45 minute break (Goel, 2009).

Therefore, in general, it would seem that when freight movements are not adequately planned or catered for by local authorities it results in a diverse array of costs and implications including those described by the freight operators above. Although as Ogden (1992) citing Watson (1975, p8) explains, local authorities have traditionally protected the general public from the negative externalities of urban freight, through a primary strategy of implementing policies that transfer the costs and or impacts back to the person or firm responsible for creating the problem. It may be the case that the total system impacts are more negative than would be achieved if the goals of freight operators were more proactively included in the urban transport planning process.

6.4.5 Local authority interventions

The interviews with local authorities brought to light a variety of initiatives that have been developed to assist freight operations. The majority of these would appear to have been overlooked by the freight transport operators interviewed. The following initiatives described by local authorities that are currently available or in operation were not cited by any of the industry representatives without explicit prompting: Detailed local freight maps; escort and route guidance service for abnormal loads; provision of

overnight lorry parking facilities; High Occupancy Vehicle (HOV) lanes and dedicated lane sharing facilities that permit heavy goods vehicle (HGV) use; and the opportunity to attend or be represented at local Freight Quality Partnership (FQP) meetings. The low level of awareness amongst the freight industry of such initiatives could be due to the inadequate communication channels between policy makers and the freight transport industry, or perhaps it is a reflection of these initiatives providing assistance for basic operational needs that it is not at the forefront of operators' thoughts. Nevertheless, it perhaps highlights a need for greater publicity of local authority freight schemes and initiatives.

Each representative from industry was asked about the ways in which local authorities assist their operations, and to mention which of the tools produced by local authorities have been the most helpful. In this instance the term 'tools' refers to initiatives such as freight specific signage, freight maps and route guidance etc. Of the industry stakeholders interviewed, five had observed a significant improvement in the amount of signage provided in urban areas. However, it was pointed out that the emphasis has more often than not been placed on installing signs that "tell you where you can't go... [which are] not helpful" and hence most operators are not reliant on them. Aside from the provision of road signs, the only other assistance recognised by the organisations interviewed are the efforts that have been made in and around London, particularly those associated with the FORS scheme, which received mixed opinions from interviewees. One operator was particularly complimentary, having found attendance at courses provided by FORS to be very beneficial. Conversely, another operator who recently joined FORS described an entirely different experience, "We jumped through all these hoops and ended up spending a bit, and I have to say that I see no benefit from that whatsoever". The guides to the London Lorry Control Scheme were also listed as a useful tool for operators, and one company was trialling a satellite navigation system which has the London Lorry Control built into it.

From an operator's perspective, it would appear that in the UK there is plenty of available information to assist freight operations in and around London, through initiatives such as FORS and other published documents and guides. Elsewhere in the UK, aside from the apparent abundance of road signs, of which the majority focus on marking unsuitable routes, operators remain largely unaware of the other tools on offer from local authorities.

The industry respondents also demonstrated a keen interest for more information from local authorities to be made easily accessible to them on the internet, and where information is received (such as route advice) incorporating it into delivery route

planning software that many of the large operators use to plan large 'milk-round' type store deliveries.

6.4.6 Challenges for the future

To identify potential challenges for urban freight movements in the future, with a particular focus on the next ten years, participants were asked to suggest 'what will be the biggest challenges for urban freight transport in the future?' and 'what things are likely to have the biggest impact on future urban freight movements?' Each of the suggestions were grouped into four over-arching themes: demand challenges which include the rise of internet shopping and changing opinions of the general public; environmental challenges that are concerned with the availability of fuel and rising fuel costs; challenges relating to network management, particularly traffic congestion and the costs of investing in infrastructure improvements; and the difficulties arising from switching urban freight onto alternative transport modes, in particular the use of rail and waterway to transport goods. The following sections: 6.4.6.1 through to 6.4.6.4 discuss these challenges in more detail.

6.4.6.1 Demand Challenges

Responses under this category include predictions for a rise in home and internet based shopping; a move towards more local product sourcing (most prevalent in food supply chains, resulting from the drive to reduce food miles and carbon emissions based on the distance travelled by the product from source to consumer); changing patterns of distribution; and increased van traffic (resulting from increased online shopping that requires a higher volume of home deliveries – traditionally carried out by courier vans).

From the interviews conducted it would appear that local authorities are becoming more aware of consumer shopping habits changing, in particular the growing trend towards online shopping. ONS (2012) reported in August that the average weekly internet sales values increased 7.5 per cent across the year as a whole when compared with the previous year (August 2011). This has resulted in a perceived fewer number of urban freight trips on large HGV's, which have been replaced by multiple van journeys undertaking home deliveries. These shifts in consumer patterns are likely to have a considerable impact on the supply chain in the future, with local authorities and the freight industry respondents expecting a rise in the number of vehicles making home deliveries to create various practical problems and operational challenges in the future. These may include: environmental issues resulting from greater numbers of small van trips; creating added traffic congestion in and around built-up and residential areas; dealing with failed deliveries, where the receiver is not present to accept their goods, which may result in multiple attempts to deliver; the creation and management

of collection points; and the more widespread introduction of unattended delivery solutions, such as locker boxes that may prompt security issues and raise practical challenges where perishable goods are being delivered.

6.4.6.2 Environmental Challenges

Many of the interviewees raised various environmental issues that are likely to impact on urban freight operations in the future. These included potential policies and restrictions to manage air pollution and control emissions; concerns over the availability of fuel and the search for more sustainable alternatives; and the price of fuel affecting operating costs.

Local authorities were particularly concerned with central government policies to reduce CO₂ and green house gas emissions, which have resulted in the establishment of many AQMA's. However, the local authorities interviewed recognized that it will be difficult to achieve a significant improvement in emissions levels at designated AQMA's without introducing some type of government approved charging scheme. The industry respondents generally shared these concerns, with many highlighting the expected costs incurred by fleet operators as local authority restrictions and central government policies continue to put in place measures to control emissions. However, with vehicle technology continually improving, local authorities are optimistic about vehicles becoming cleaner in the future. As Euro VI standard engines are introduced and the availability of alternative fuel vehicles increases there is likely to be an expectation on fleet operators to update their vehicles, which is an expensive process to undertake, and many operators may not have sufficient financial resources to support such upgrades.

The rising cost of fuel and its future availability were also major issues for those interviewed, as fossil fuels become an increasingly scarce resource, their cost will likely continue to rise. Therefore, with fuel cost and availability continuing to be a problem, both industry and local authorities are recognizing the need to investigate alternative solutions. For the freight industry, some of the alternative fuels may not be suitable for the nature of operations undertaken. For example, one industry respondent whose fleet delivers to hundreds of grocery stores on a daily basis noted that an alternative to diesel fuel is "unlikely to be electric vehicles, since depots are located up to 100km from stores". Electric vehicle technology is generally regarded as unsuitable for the freight industry for two reasons (as summarized by one of the local authorities interviewed): the amount of power that would be required to move an HGV over long distances would likely equate to more than the battery's capacity; and the time taken to repeatedly charge the battery would be impractical given the vehicle's purpose. It is

also quite conceivable that the cost of electric vehicle charging could outweigh the current cost of diesel fuel for fleet operators. Therefore, alternative fuels such as bio-fuel or LPG (liquefied petroleum gas) are being considered as potential replacements for traditional diesel power. However, some industry respondents raised various reliability issues with bio-fuels, which included concerns over invalidating a truck manufacturer's warranty, and the fact that many organizations lease their truck and may not be permitted to use alternative fuels. One respondent commented that the road haulage industry needs to be a little bit cautious regarding the introduction and promotion of alternative fuel vehicles in urban areas, and recommended that it should be "on the basis of a firm understanding of the technology and how it is likely to develop".

6.4.6.3 Network Management Challenges

One of the most common responses with regard to the challenges facing urban freight transport operations in the future was increasing levels of traffic congestion. Local authorities recognise that heavy traffic congestion combined with town and city centre delivery time-windows are likely to impact negatively on urban deliveries, as operators are challenged to complete deliveries within the time constraints. Many local authorities expect levels of traffic congestion to rise and acknowledge the need to address capacity constraints through either investment in infrastructure improvements or the introduction of more widespread congestion charging schemes to manage congestion levels in the future.

Similarly, industry respondents raised concerns about rising traffic volumes on the urban road network, which will likely impede deliveries to high street retailers in the future. This results in vehicles spending an increased amount of time on the road, which not only raises the risk of accidents occurring, but also wastes fuel as vehicle engines idle in stationary traffic on congested urban roads. Conversely, only one industry respondent had an optimistic viewpoint, believing that congestion may improve as fuel prices rise, causing people to potentially re-think their travel plans for unnecessary journeys by car. On the whole, industry respondents were particularly concerned about the likelihood of congestion charging schemes being introduced in the future, for which they envisage, will incur a further cost for operators to absorb. However, evidence from Givoni (2009 p3) has shown that by 2007 the level of traffic congestion in Central London's Congestion Charging zone had returned to 2.3min/km, which is the average excess delay equivalent to the base congestion level in 2002, before the scheme was introduced. This suggests that deterring chargeable traffic from the road network does not necessarily have a direct impact on reducing the overall level of traffic congestion (ibid), thereby indicating that congestion charging schemes

will have little positive effect on urban freight operations. More recently Central London's road network has experienced significant road works due to major renewals of utility services, and in some places has undergone the reallocation of road space, which will have impacted congestion levels. However, if these adjustments create more segregated space for pedestrians, cyclists and or buses it will further negatively impact the freight industry, leading potentially higher operating costs.

6.4.6.4 Challenge of switching mode

Another challenge, described in the interviews was the potential to shift urban freight onto alternative more sustainable modes of transport, in particular rail or inland waterway; and a shift to greater inter-modal urban freight transport. The adoption of rail freight was mentioned most frequently, followed by the introduction of transshipment facilities for interchanging between modes. However, it was recognised that this is dependent on the nature of the products being moved, the available capacity on inland waterways and the rail network, and the availability of suitable infrastructure for transshipment onto road vehicles for the last-mile delivery.

The vision of shifting more freight onto rail is linked with the current belief that freight is transported more sustainably on rail than it is on the road network, for instance it is more sustainable and economical to operate one train over a long distance than it is to operate fifteen lorries to carry the equivalent volume of cargo. Rail freight is most suited to transporting large quantities of bulk products or raw materials such as coal and grain, however from a commercial perspective it could be argued that despite the sustainability benefits of rail transport, road freight is preferable because it is better able to meet business needs: the trend towards Just-in-Time (JIT) and lean manufacturing practices. For example, one industry respondent whose organisation procures bulk raw material to manufacture animal feed explained that a late delivery of raw material by rail could potentially halt production in the factory; as opposed to the same delivery arriving on a number of road vehicles that are less likely to interrupt production if one vehicle arrives late with a delivery.

Half of the local authorities interviewed highlighted rail as the most likely alternative to road freight transport in the future. In particular, many hope that long distance freight trips will eventually switch from road to rail, and in some areas councils are intent on providing the necessary infrastructure to accommodate this. For example, one local authority explained that there are plans in place to "safeguard land...for intermodal terminals" and the facilities proposed in the Local Development Framework will cater for transshipment from water to rail freight, and from road to rail. In areas with a port,

local authorities believe the port will be able to provide plenty of opportunities for a switch to rail freight, since port facilities can be utilised for transshipment in the future.

However, there was little indication from those interviewed that they had devoted much thought to the potential implications of switching to rail transport. For instance, the use of rail for urban freight presents some practical problems for the 'last-mile' delivery. Since rail is unable to support door-to-door distribution for the majority of goods that are delivered into urban areas, the issue of double-handling is raised as goods would need to be transhipped onto road vehicles for final delivery to customers. Currently, the necessary infrastructure required to facilitate the use of rail or water transport direct to receivers in town and city centre's does not exist, and there is also a lack of financial resources available to fund its construction. If modal switch were to become a reality it would likely prompt a debate on whether the public or private sector should be responsible for financing such long-term infrastructure projects.

Other responses included the introduction of cycle freight schemes for the distribution of small urban consignments, and some places were keen to support such initiatives, and if approached about such a venture said they would be pleased to encourage it. Electric vehicles for operating out of a consolidation centre to deliver small consignments in and around urban areas were also mentioned. These would likely encourage a drive towards the creation of sites for modal interchange and the construction of urban consolidation centres on the outskirts of towns and cities. It is also possible that some authorities would look to redevelop derelict urban sites for logistics facilities, which could encourage some collaboration for shared use amongst logistics operators.

In general it was felt that there is no need to rush towards evaluating potential switches to other modes, in particular rail or water based transport. This is because the most suitable goods for carriage on those modes are generally already being transported by rail and water, for example bulk goods such as aggregates and coal. However, where the goods being transported require onward distribution to their final destination, switching modes would only create double-handling as products are put on rail or water first, and then transferred to a lorry later in the journey. Therefore a major modal switch is not predicted and for many there is a firm belief that road based freight will continue to dominate for the foreseeable future.

6.4.7 Future issues and reactions to potential scenarios

The selection of TDM measures that were highlighted in chapter 2 of this thesis are often considered by local authorities as ways to manage and or restrict the movement of freight in congested urban areas. In particular, the introduction of consolidation

centres, congestion charging and lane share schemes, each of which are either currently operating in specific urban locations or have undergone trials in the UK. Therefore, towards the end of each interview, respondents were asked for their views on the implications of wider implementation of each of these scenarios.

6.4.7.1 Consolidation Centres

As part of the discussion on potential future scenarios for urban freight distribution, the concept of introducing Urban Consolidation Centres (UCC's), together with the re-development of urban areas to facilitate the construction of UCC's was examined.

With distribution patterns envisaged to change in the future, some local authorities have identified potential sites for the development of an Urban Consolidation Centre (UCC). One local authority has even begun discussions with a 3rd party logistics provider over the potential operation of such a facility in its area. The reason for this positive approach towards consolidation is that the council would ideally like the majority of deliveries destined for the town centre retailers to go through the consolidation centre to reduce the number of HGV's entering the CBD. It is anticipated that plans to positively re-develop some town centres in addition to the development of new distribution centres around the perimeter of the area could improve urban freight movements in the future. Some of the other local authorities would like to see combined UCC's and intermodal terminals in the future, which would complement the move to encourage greater modal shift of freight onto the railways and thus help to reduce traffic congestion.

The local authorities interviewed hope that as transport becomes increasingly more inter-modal that a significant change in land-use patterns will be necessitated. The availability of fossil fuels and their alternatives is also likely to have a considerable effect on land use in the future, since it will become more important to identify available land in close proximity to urban centres for the development of logistics facilities. This is especially important as rising land values force out lower value uses such as logistics. Therefore it is anticipated that mixed-use logistics facilities will develop, which may include offices being positioned above warehouses that enable logistics facilities to be accommodated closer to urban centres on higher value land. In addition, it was suggested that the development of UCC's could potentially improve collaboration between supply chain actors in the future. However, this is dependent on the willingness of individual businesses to collaborate and share resources.

Industry respondents generally agreed that UCC's are a good idea in principle, however raised a number of operational issues and concerns. These include: the monitoring, handling and distribution of temperature controlled goods if a third party

UCC were to be used; security issues surrounding high value consumables such as cigarettes and spirits; and increased lead times for products to reach high street retailers due to the cross-docking procedures involved in using a UCC. Although, one local authority proposed a solution to the issue of competitor goods being bundled together, whereby roll cages can be utilised to keep separate different retailers' products. In addition, they also advocated that there needs to be extensive advertisement of the benefits of using a consolidated distribution facility in order to encourage user uptake, although this assumes voluntary use of an UCC.

Another key debate that arose from discussions with both industry and local authorities was the issue of who should fund the construction and management of a UCC. The respondents had mixed views on this issue, with some local authorities appearing to scope UCC projects with a subsidy from public funds, and others identifying the need for any such project to be established as a private venture. However, it could be argued that the current distribution patterns for many large high street retailers is in essence already consolidated, and therefore a separate UCC would be surplus to requirements.

6.4.7.2 Urban Congestion Charging

The interviewees were asked what the impact would be on their operations if cities nationwide were to adopt a congestion charge similar to the one operating in London. It was also felt by some of the industry operators interviewed that one of the main motivating factors in a local authorities decision to introduce congestion charging schemes is revenue generation. Responses from the freight industry respondents in most cases indicated that there would likely be a financial impact on their operations, through increased operating and administration costs that may well be difficult to pass on to customers.

One of the grocery distributors explained how their company currently ensures that deliveries into Central London avoid the congestion charge; and intimated that if more cities were to adopt a similar scheme that they would consider reducing the frequency of deliveries to stores, which would likely impact the on-shelf availability of products. Another grocery retailer had similar concerns relating to the cost of such a scheme impacting their business, currently deliveries out of one depot alone cost the organization approximately £30,000 p.a. on the London Congestion Charge, which they fear would impact similarly if other cities adopted a charging scheme.

6.4.7.3 Lane Share Schemes

McLeod and Cherrett (2010) reviewed a selection of lane share schemes that have been trialled and implemented in cities around the world since the 1990's. These included Newcastle-upon-Tyne's 'no-car' lanes for which there is little documentation

evaluating the scheme's benefits; a small-scale trial in Gothenburg, Sweden of shared freight/bus lanes in 2004, which despite reports of its success was discontinued after bus operators objected; and a Japanese shared-use bus priority lane.

The interview participants were asked for their views on the implementation of shared lanes in other urban areas in the UK. Most of the industry participants were in favour of the measures, viewing them as a mechanism to improve traffic flows through city centres and improve journey time reliability. Although it was noted by some that if such schemes were to be introduced more widely their success would likely depend on local authorities' ability to promote and encourage their use. One industry respondent highlighted that existing regulations as to the use of bus lanes vary widely from one local authority to the next that they in fact cause too much confusion for drivers, particularly lorry drivers who often travel through many different local authority areas in one day. Another operator respondent raised the question of why one set of traffic should be prioritised over another, especially since all road users are effectively paying their way equally (through road tax).

The local authority respondents were in contrast much more divided on the issue of lane sharing schemes. Only a few could see the potential benefits from shared priority lanes to manage traffic flows, having experimented with '2+' lanes between the motorway and city centre in areas that are heavily industrialised. Conversely others were completely against allowing lorries to share lanes on the grounds that it is a politically unacceptable measure to implement that would require constant policing.

6.5 Chapter summary

The interviews conducted as part of the first stage of the empirical research conducted in this study have brought to light the current views on urban freight from the perspectives of both local authorities and the freight transport industry. In particular, they have enabled opinions and perspectives from both stakeholder groups on urban freight problems and issues to be identified; existing solutions offered by local authorities to be examined, and additionally has identified some of the key challenges that are expected to affect urban freight movements over the next ten years.

As a result, the different perspectives have highlighted a gap in communication between the freight transport industry and local authority planners and policy makers. In the locations studied across the UK, this appears to lead towards a lack of understanding of the operational problems and issues faced by logistics operators on a daily basis; and of the impacts that current urban transport policies have on freight operations. For example, the implications of short delivery time-windows and restricted delivery times that result in uneconomical and inefficient deliveries to the urban area.

The interviews also highlighted a lack of consideration from local authorities for ways to address freight issues in the future, with one of their most common suggestions being to move freight onto rail as an alternative to using road, despite the inappropriateness for many freight flows and the difficulties that this would cause with last-mile distribution.

It would appear that with regards to urban freight movements, local authorities are most concerned with minimizing and preventing negative externalities such as noise, air pollution, and the promotion of safer urban environments for pedestrians. Hence, their focus is generally on implementing restrictive measures, including loading, waiting and time of day restrictions, and low emission zones that address these issues. However, in many cases these restrictions and regulations have largely been exhausted, and indeed often failed to fit with current delivery and distribution patterns. New technology including quieter, less polluting vehicle engines; and satellite navigation systems that are capable of providing truck drivers with optimal routes to avoid city centres are now available, yet the restrictions in many urban areas remain in place.

Some of these misunderstandings between the stakeholder groups could be linked to the limited amount of data on urban freight movements (such as traffic counts), compared with public transport data that is available to local authority transport planners. Although, it could be argued that freight operators are themselves to some extent responsible for local authority misunderstandings of the impacts policy restrictions have on day to day freight operations. Lindholm (2012) suggests that this may be due to a resistance from operators to share such information with local authorities for fear of sensitive company information being made public and available to their competitors, although this was not mentioned by any of the operators interviewed here.

The local authorities also highlighted a range of initiatives that had been specifically developed for and aimed at benefiting freight operators. These included: Freight Quality Partnerships, membership schemes (FORS and Eco-Stars), local area freight maps, early satellite navigation applications, improved road signs and investments in infrastructure. Many of these have been largely overlooked by the freight transport industry, with the exceptions of improved road signage and membership schemes. This could be due to insufficient advertisement and communication of local authorities' efforts to accommodate and provide for freight; or perhaps it is an indication that local authorities are targeting their efforts towards solving problems that operators do not perceive to be an issue that requires addressing.

The interview findings also indicate a distinct lack of engagement between freight operators and local authorities. Currently, in the UK FQP's provide the only means of formal engagement between the freight industry and local authorities; and whilst outcomes from partnership meetings can offer considerable benefits to both parties involved, the greatest challenge comes from maintaining the focus and engagement from members (Lindholm and Browne, 2013). There is very little evidence of widespread momentum and engagement with FQP's in the UK, although in general there appears to be willingness from both stakeholder groups to interact more and improve engagement between the public and private sector with regards to freight issues. This has identified the need for more innovative stakeholder engagement and the design of a method to facilitate it, which was described in section 5.6 of the previous chapter. The workshop method has been designed to enable key stakeholders in urban freight to come together to focus on a particular issue or problem, and work as a group to discuss and debate potential solutions. The findings from three freight stakeholder workshops used to test a method for engagement will be presented and discussed in Chapter Seven.

7 Chapter Seven – Outcomes from the Freight Workshops

7.1 Introduction

This chapter considers the findings of the three workshops that have been conducted with representatives from local authorities and the freight transport industry in the UK. These workshops were used to address the fourth research aim, which was to create and test a process that enables freight stakeholders to be included in the initial creation and design of future urban TDM measures and policies so that they fully identify and incorporate the needs of urban logistics.

The workshops were structured as set out in section 5.6 of chapter five. Each workshop will be addressed in turn, including a discussion on the resulting outcomes in response to the stimulus question *'In what ways could urban transport policy be amended to improve operations in urban areas that will ease current urban traffic problems?'* which was used as the theme for each workshop. Highlights from the ideas generated by both local authorities and the freight transport industry from each workshop will be presented, along with the results from a ranking exercise, whereby participants individually rated each option based on how effective and how acceptable they felt the implementation of the ideas would be. In addition, the benefits associated with the top rated options in terms of effectiveness will also be presented. The findings from across all three workshops are then compared, thus identifying both the similarities between some of the themes raised at each of the workshops; and the nature of ideas generated as a result of joint stakeholder participation.

The chapter concludes with an evaluation of the workshops as a method for encouraging greater stakeholder engagement in urban freight transport decision making. The responses to the evaluation questionnaires that invited feedback from participants at the end of each workshop have been used to help determine the overall effectiveness of the process as method for engaging freight stakeholders from both the private and public sectors.

To maintain consistency, each workshop followed the same format (including the same stimulus question and overarching theme), and utilised a selection of techniques adapted from Delbecq et al. (1975) Nominal Group Technique (NGT), which were explained in Chapter Five. All the workshops were free to attend and lasted for half a day, over a morning. They were held in three different locations around the UK in hotel meeting rooms, which were deemed to be a suitable venue and a neutral location for

all stakeholder groups involved. A target of ten participants was aimed for at each event, although attendance varied between the events from seven to nine attendees.

7.2 Workshop One

7.2.1 About the workshop and its participants

This workshop was held in Wetherby, West Yorkshire on Thursday 8th December 2011 from 08:15 to 12:00 and primarily aimed to attract stakeholders from across West and North Yorkshire to participate. For this workshop individual invitations were sent out by email to people in the region who had already taken part in a research interview as well as to other contacts known to the research team. In addition, some individuals were asked to pass on the invitation or to recommend the workshop to colleagues and other people whom they thought may be interested in attending.

Despite ten participants being targeted, only seven attended the workshop. Of the seven participants, four represented local authorities and three were from the freight transport industry. The weeks that run up to Christmas, are a busy period for the freight transport industry, with studies reporting twenty-five percent more deliveries being made to the average business during peak trading weeks such as the build up to Christmas (Cherrett et al. 2012). This may be the reason that fewer freight operators were able to attend the workshop. This has highlighted a key period in the calendar that is generally unsuitable for engagement between these two stakeholder groups.

The following table (Table 7-1) shows the key characteristics of the participating local authorities in order of their approximate population size based on the mid-2010 population estimates for UK local authorities (ONS, 2011) together with the nature of the various urban areas within their remit. Table 7-2 lists the industry representatives that attended by the type of organisation and the industry sectors in which they operate.

Local Authority (no. reps)	Approx Population (2010)	Historic Centre	Market Town in rural area	Industrial	Major retail sector	Major Service sector activity	Tourism
A (2)	200,000	✓					✓
B (1)	325,000			✓	✓	✓	
C (1)	600,000	✓	✓				✓

Table 7-1 Participating local authorities by approximate population size and nature of urban area

Freight Industry / Urban Freight Stakeholder Representative (no. reps)	Type of Organisation	Industry Sector
A (1)	Local skip provider	Waste Management
B (1)	Major supermarket chain	Grocery distributor
C (1)	Consultancy	Transport consultant to local authorities

Table 7-2 Participants representing the freight transport industry by industry sector

7.2.2 Session One – Idea Generation

For the first session the stakeholders were divided into two groups, the red group was local authority stakeholders, and the blue group was for participants from the freight industry. All the participants were asked, individually, to write ideas in response to the following stimulus question:

'In what ways could urban transport policy be amended to improve operations in urban areas that will ease current urban traffic problems?'

The ideas that the individuals generated were then collected through a round-robin style recording of ideas within their respective groups. The ideas gathered from both groups are shown in the following tables (Table 7-3 and Table 7-4) and are written as the participants explained them.

INITIAL IDEAS GENERATED BY LOCAL AUTHORITIES

- There is not a 'one size fits all' fix to solving urban traffic problems. Realise that what works for one place may be unsuitable for others.
- It is important to understand where individual places (towns, cities, and urban areas) fit in the logistics hierarchy. For example, store priority for deliveries – Leeds or York will be more important than Harrogate or Northallerton stores. Bigger flagship stores are likely to be serviced by delivery vehicles before smaller ones of less importance. Deliveries are not always going to be arranged in order of geographical proximity and location. Policies and measures (TDM) in urban areas could take this into account.
- Engage and consult in a more focused environment with the freight industry, for example the establishment of Project Groups (as opposed to a general FQP). E.g. North Yorkshire have two FQP's which have developed from a need to improve freight movements throughout and within the county for logging and quarrying. These have survived and remain active FQP's as they exist for a focused cause/project.
- Educate local politicians on the importance of freight - also can extend education to the public too – may help alter negative impressions and perceptions of urban freight. E.g. lorries are less polluting and quieter now than they used to be.
- Travel plan for the freight industry, so deliveries can be arranged by street/zone on different days. Potential for this to be a flexible scheme.
- Active traffic management and traffic camera monitoring to enable better flowing traffic and help reduce congestion.
- Reduce congestion to make it easier to deliver freight and control it getting worse!
- HGV routing and working with the satellite navigation industry - look to agree mapping routes by all parties – communities, industry, and highways.
- State a key policy for all – buses, freight etc.
- Freight to be considered in planning applications and to be included in the local development framework etc. (have it all packaged together for budgets).
- Create better access for essential minor services – essentially van traffic i.e. photocopiers and tills – servicing people, maintenance.
- Check that road signs are displaying accurate information and that freight access signs are consistent.

- Ask for a budget (pot of money) to be allocated for spending on freight improvements – various potential funders could be sought for this. Although this would require a business case to be put together.
- Encouraging and promoting priority for low emission freight vehicles.
- Safety and cyclists – awareness needs to be raised, both sides need to be educated and infrastructure improved. Similar to scheme of national awareness promotion whereby lorries carry a sticker advertising the campaign.
- Revisit Traffic Regulation Orders (TRO's) and include community engagement. Particularly on noise and night deliveries, air quality and CO₂ policies. These need to be checked for accuracy and relevance – amend/remove as required.
- Improve education and perception around freight transport.
- Possibility of creating mini loading centres – a step towards urban consolidation. Requires assessing delivery points and their closest unloading facility.
- Look to re-evaluate delivery windows in town centre's – are these all necessary / appropriate?

Table 7-3 Ideas generated by local authorities in Workshop One

The ideas generated by local authorities on ways to improve operations in urban areas were focused around the following themes: tailoring solutions and policies to specific urban areas including investigating the possibility of mini-loading centres; ways to educate people about freight operations and hence improve perceptions of freight activity; encouraging greater engagement between urban freight stakeholders including communication with urban planners; the development of innovative tools to assist freight operations including better use of Intelligent Transport Systems for active traffic management and HGV compatible satellite navigation routing software; and updating and improving current policy information and re-assessing the allocation of financial resources.

Of the ideas initially generated by the local authorities present at the first workshop, three themes arose that resembled those classified by Munúzuri et al. (2005). These were the possible development of mini-loading centres, solutions relating to traffic management, and solutions that enforce and promote the implementation of other specific measures.

The idea of developing mini-loading centres is most closely related to the concept of city terminals (or transshipment centres) that Munúzuri et al. (2005) explains are intended to improve the load factors of delivery vehicles, whereby a small freight

transport centre is located within an urban area to enable large lorries to drop-off goods for onward final delivery by a fleet of smaller vehicles. Often, these transshipment facilities develop in large parking areas near to the congested commercial areas of a city, within easy access of main trunk roads and city ring-roads, which have the space to accommodate large trucks and a fleet of smaller vans.

In terms of solutions that relate to traffic management various ideas were put forward by the local authorities. Although only active traffic management using camera monitoring to improve traffic flow on congested urban road networks, and working with the satellite navigation industry to agree suitable HGV route guidance resembled the real time traffic information solutions discussed by Munūzuri et al. (2005).

Munūzuri et al. (2005) also included a variety of ways for local authorities to promote and enforce the application of specific solutions. Amongst them were the promotion of city logistics forums, loosely defined as opportunities for the opinions of involved stakeholders to be considered prior to a solution being implemented. In the UK, Freight Quality Partnerships (FQP's) have been implemented with the intention of developing an understanding of freight distribution problems and issues, and to promote constructive solutions that balance the need for access to goods and services with local environmental and social concerns (DFT, 2003). This links in with the local authorities' idea of providing a more focused environment for local authorities to engage and consult with the freight industry, for example through the establishment of Project Groups as opposed to a more general FQP. Information support and awareness campaigns to disseminate city logistics issues (Munūzuri et al. 2005) were also proposed by local authorities as a way of educating and improving the perceptions of urban freight and to assist with better promotion of incentives for using low emission vehicles.

INITIAL IDEAS GENERATED BY FREIGHT INDUSTRY REPRESENTATIVES
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- | |
|---|
| <ul style="list-style-type: none"> ▪ Planning authorities, planners start the operational procedures for sites. Help with organising – more thought at initial stages. Needs to be a dynamic response to different scale issues, seems that planners lack awareness and respect for freight requirements. ▪ Traffic managers in local authorities need to have more knowledge of the traffic systems – Freight operators as well! Traffic managers can do a lot to assist. ▪ Allow early morning/night time deliveries, to reduce impact of vehicles. Clarify and improve accessibility of information on this, possibly improve consistency? ▪ Create more, smaller distribution centres –possibly transshipment to smaller vehicles? Although this would cause issues with some operators. ▪ Better engagement: LA's and freight operators. Traffic systems with freight forums, sharing information / data, more involvement. ▪ Allow trucks to use bus lanes at certain times – these are often under-utilised, some are peak hours only, others all day. ▪ Introduce colour coded freight routes to utilise weight limits for local operators. ▪ Targeted assistance for HGV's. ▪ Provision of unloading bays – increase priority. ▪ 7.5ton vehicles could be increased to a gross 8.5t. ▪ Avoid restricting vehicle sizes to reduce need for multiple deliveries. ▪ Local authorities need to recognise the delivery of freight transport to understand it. ▪ Freight operators need to be made aware when or if there is an urban freight policy in operation. ▪ Avoid bans on B/H deliveries. |
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Table 7-4 Ideas generated by freight industry representatives in Workshop One

The ideas generated by the freight industry representatives on ways to improve operations in urban areas generally focused around the following themes: using engagement activities to educate local authorities and town planners about freight; the introduction of more location specific schemes including the introduction of urban consolidation centres and updating local policy restrictions; and the development of local authority tools and initiatives to assist with freight routing.

It was surprising to find that the industry stakeholders also put forward the idea of developing urban consolidation or transshipment centres at the workshop, especially given that neither of the freight transport operators present (skip company and supermarket chain) would be able to utilise an UCC. The results of a recent survey of urban freight stakeholders in Rome by Stathopoulos et al. (2012), on levels of acceptability towards urban freight policies reported the introduction of urban consolidation centre type schemes were met with the most reluctance from the operators surveyed; whereas, policies which generate the least cost for users were rated most highly amongst the freight operators.

The industry participants also seemed to support the development of freight routing tools at a local authority level, however this appears to contradict the earlier finding reported in Chapter 6 (section 6.4.5) that despite the efforts of some local authorities, operators remain largely unaware of the tools available to assist them. In addition, many of the operators' ideas suggest simple amendments and alterations to current restrictions and regulations imposed by local authorities. Another suggestion that had also been discussed in chapter 6 (section 6.4.7.3) was to allow trucks to enter bus lanes at particular times of day, which resembles the various forms of shared-use lanes that have been trialed and implemented in a number of cities around the world since the 1990's; although to date studies have shown that there is no significant benefit for buses, lorries and vans using this facility (McLeod and Cherrett, 2010).

Some similar ideas were generated by both stakeholder groups independently of each other. These ideas focused around the themes of tailoring of policies and restrictions to specific urban locations, creating opportunities for wider stakeholder engagement about urban freight issues, finding ways to improve the perceptions of the public and politicians on urban freight through education, and developing innovative local authority tools to assist urban freight operations. Interestingly, education and awareness about urban freight transport operations appears to be a major theme that was raised by both stakeholder groups during the idea generation, but has not really developed as a major topic for discussion in academic studies.

7.2.3 Session Two – Plenary I

The first plenary session of the workshop provided the opportunity for the ideas generated by both stakeholder groups to be discussed and debated, in order to select a reduced set of ideas to be taken forward and voted on.

Based on this plenary discussion on the ideas generated, the themes that were excluded from the combined list included: the encouragement and promotion of priority for low emission freight vehicles; awareness campaigns regarding safety and cyclists;

increasing weight limits in urban areas; and the introduction of colour coded freight routes according to vehicle weight limit. Since these were not prioritized by the participants in the discussion, it is likely that they represent ideas for which there was insufficient support or agreement to progress the idea any further through the workshop process. The discussion also provided an opportunity for any additional ideas to be put forward for potential inclusion in the combined list, and therefore the suggestion of a Do's and Don'ts list for freight operators to enable them to create and tailor their own plans was added at this point.

The ideas carried forward from the initial idea generation discussed in the previous section were labeled and displayed on flip chart paper at the workshop as a combined list. Table 7-5 displays them as a list of options for which all the participants voted on the effectiveness, acceptability of each and ranked them in order of preference. The list constitutes ideas from both stakeholder groups (local authorities and industry), that were discussed in the first plenary session where the groups presented their ideas to each other.

Using the pre-prepared voting sheets (Appendix X), each participant was asked to rate each of the options according to:

- a) How effective do you think the action/policy would be?
- b) How acceptable do you find the option to be?

A scale of zero-three was used as a way to gauge the level of effectiveness for each option, where a score of zero indicated that this would not be an effective way to improve urban freight operations, and three would indicate a high degree of effectiveness. Acceptability was measured on a scale of Yes (this would be an acceptable policy or action to implement), Maybe (the policy or action would only be acceptable under particular circumstances), or No (it would not be acceptable under any circumstances to implement this idea). These scales were used throughout each workshop to maintain consistency. In addition, participants were asked to rank the list in order of preference according to their most favoured options (i.e. which options they liked most).

At this stage, participants remained in their representative stakeholder group (Local authorities or freight operators), which enabled the results of the votes to be aggregated by stakeholder group. This meant that comparisons between the groups' preferences could be drawn out to identify any potential areas of agreement or disagreement between the stakeholder groups.

The results of the voting session from the first workshop are presented in the following section (7.2.4), along with a discussion that highlights key differences in opinion and areas for potential further collaboration.

Option	Short name	Ideas in detail
A	Education	Improve education - politicians, the public etc. on the importance of freight in the economy.
B	Dynamic planning	Planning authorities to become more dynamic - satisfy individual locations needs and improve the general approach to planning.
C	Revisit TRO's	Revisit Traffic Regulation Orders - open up delivery restrictions and night time bans, re-assess historic planning conditions.
D	Engagement	Better engagement b/w local authorities & freight operators - to focus on specific issues, need to improve coordination and highlight the right people in LA to contact.
E	ITS	Make use of intelligent transport systems and traffic signalling to improve traffic flows.
F	Policy Awareness	Help improve operator awareness of transport policy - freight specific and universal policies, make consistent and accessible.
G	Freight Travel Plan	Create a Freight Travel Plan for individual urban areas.
H	Do's & Don'ts	Formulate a Do's & Don'ts list for freight operators - enabling operators to create own tailored plans.
I	Signage	Improved HGV routing and signs in urban areas
J	Bus lanes	Allow trucks to use bus lanes
K	Control congestion	Control current congestion situation and continue to look for opportunities to improve freight access.
L	UCC	Encourage small scale consolidation and transshipments, assess delivery points and loading facilities, highlight key locations for shared consolidation points.
M	Loading bays	Re-evaluate unloading bays.

Table 7-5 Combined list of policy options generated in workshop one

7.2.4 Session Three – Preferences for options generated

The following chart (Figure 7-1) shows the results from the participants voting on the combined list of policy options generated (Table 7-5) according to the level of effectiveness and acceptability of each option, and participants' preferences for each option. The results of the effectiveness and acceptability have been displayed in the positive and negative y-axis respectively, and the options have been placed in order of preference along the x-axis, determined by the ranking of options in terms of favourability. Since a scale of zero to three was used as a way to gauge the level of effectiveness for each option, the mean vote from each stakeholder group for each of the options voted on was calculated using the total score achieved by each option. However, since letters cannot be averaged, the level of acceptability towards each option was calculated from the votes by converting the initial 'Yes', 'No', and 'Maybe' onto a numeric scale so as to determine a value. For each 'Yes' vote, a score of two

was given; a 'Maybe' vote was awarded a score of one; and a 'No' scored zero. This scoring system made it possible to calculate the mean acceptability from each group of stakeholders, which is displayed on the chart. In order to determine which options the stakeholders from both groups had a preference for, the results from the ranking exercise were used to determine the median rank for each option. These methods were repeated for the results from each of the subsequent two workshops so as to maintain consistency.

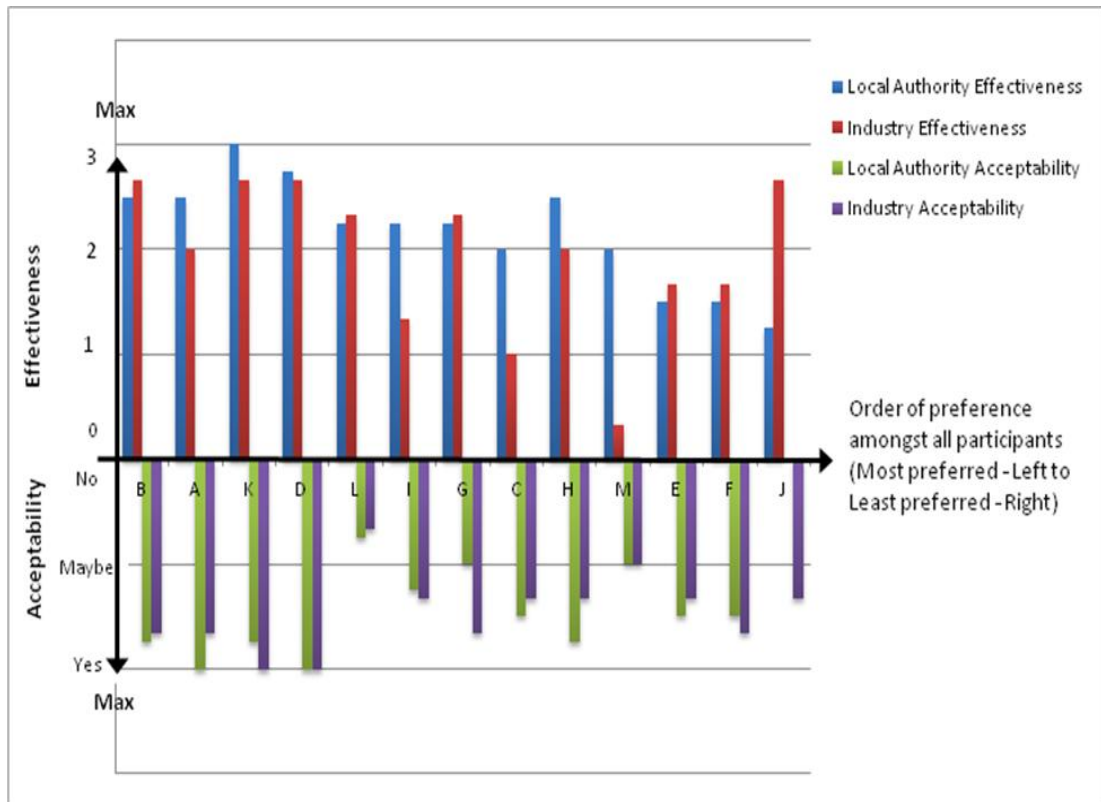


Figure 7-1 Chart showing levels of effectiveness and acceptability of policy options chosen and rated by participants at workshop one

The chart in Figure 7-1 shows that the workshop group as a whole (local authorities and freight operators) were most favourable towards option B (Dynamic Planning – coordination within local authorities so as to satisfy the needs of individual locations) and option A (Education regarding the importance of freight). These options also received similar levels of expected acceptability and effectiveness amongst both stakeholder groups. The suggestion of Dynamic Planning that is specific to individual locations (option B) is perhaps a recognition amongst both stakeholder groups that each urban area has its own unique characteristics and diverse range of problems, and therefore there is no one size fits all solution to the problems of urban freight (Ogden, 1992). Whilst option A reflects the earlier findings discussed in chapter 6 (section 6.4.1) which confirmed there is a general lack of knowledge and understanding amongst local

authority transport planners of freight operations; and consensus that the general public take freight services for granted leaving freight issues low down the political agenda (Chapter 6, section 6.4.2.2).

Conversely, option J (Allowing trucks to use bus lanes) was ranked the lowest, with zero acceptability amongst the local authorities, and some disagreement amongst local authorities as to the potential effectiveness of this measure. This could be due to the expected resultant increase in travel time that McLeod and Cherrett (2010) demonstrated through modeling the effects of various Bus/HGV lane sharing options in Winchester city centre. Unsurprisingly, the industry representatives believed that using bus lanes would be an effective way to improve traffic flow through congested urban areas and improve freight operations.

Option K (Control congestion) and option D (Improved engagement between local authorities and freight operators to focus on specific issues) achieved the closest level of agreement amongst both stakeholder groups. However, it could be argued that option K is not a specific policy or measure that could be implemented with any immediate effect, but rather it is a desire shared by both parties to look for opportunities that both control and manage the current level of congestion whilst improving access for freight. Although, it is possible that other options suggested by the stakeholders could have an impact on reducing congestion levels if implemented successfully. For example, improving signage to direct HGVs along the most suitable routes around urban centres (option I), improvements to current loading / unloading facilities on street (option M), and or revisiting traffic regulation orders (TRO's) to amend delivery restrictions (option C) could each help to improve traffic flow and thus reduce congestion on the urban road network. As much as traffic congestion is a problem for logistics operations in urban areas, McKinnon et al. (2009) points out that in most places traffic congestion is predictable and regular, therefore enabling freight operators to adapt their operations to accommodate it.

Better engagement between local authorities and freight operators (option D) also achieved a high level of agreement from all the participants. This finding mirrors that of the interviews discussed in chapter 6, which was one of the primary motivators for establishing and testing this workshop method. However, the plenary discussions highlighted the importance of improving existing communication channels between local authorities and freight operators, and in particular that local authorities highlight the most appropriate person or team of people to contact regarding freight issues. This could have the benefit of establishing greater links between local authorities and the

local business community, and therefore creating a network for potential collaboration in the future.

The options that industry and local authorities disagreed on the most were options M, J and C. Local authorities rated option M (re-evaluation of loading bays) as a potentially effective method of improving urban freight operations, as McLeod and Cherrett (2011) explain that in a survey of Winchester, some loading areas were classed as undesirable because they cause obstruction to other road users and or present road safety hazards, the authors also note that when lorries park in unsuitable locations such as on a double yellow line that it results in a general delay to traffic. However, the industry representatives rated this option the lowest in terms of effectiveness, despite both parties agreeing that it was a fairly acceptable option to implement. Option C (revisiting TRO's to amend delivery restrictions) by way of removing night time bans that are no longer applicable, and re-assessing historic planning conditions that restrict freight movements, was rated highly on the effectiveness scale by local authorities but this view was not shared by all the freight industry participants. This could be due to the freight industry having become accustomed to arranging urban freight operations at times that accommodate these restrictions, or due to the nature of the operations that operators at this workshop are involved in. For instance, the collection or delivery of skips at night time is an unlikely activity even if it were permitted, due to the level of noise generated.

The only option that was rated significantly higher in effectiveness, compared to a very low level of acceptability (with the exception of option J, discussed earlier) was option L (Small scale urban consolidation and transshipment centres). Recent research by Browne et al. (2007b) evaluated the potential of using an urban consolidation centre (UCC) and highlighted the independent, small scale retailers whose deliveries are not already subject to high levels of consolidation; and transport operators engaged in "small-scale, multi-drop deliveries where the location, parking and unloading time are disproportionate to the size of the delivery" (ibid, p61) are most likely to benefit from an UCC. However, the low acceptability rating may be due to the low reported success rates to date of UCC's in Europe, and the uncertainty surrounding the responsibility for managing and funding such a scheme, a concern which was initially raised in the interviews (Chapter 6, section 6.4.7.1).

7.2.5 Session Four – Plenary II

The final session of the workshops provided participants with the opportunity to further discuss the wider benefits of implementing the top rated options. Due to the limited amount of time available at each workshop for the facilitators to tally the results, participants were asked to focus on the options rated as most effective. Now in mixed

stakeholder groups (Local authorities and freight operators), participants were tasked with considering the potential benefits and positive reasons for implementing the ideas. Table 7.6 summarises the benefits discussed by participants for the top four options that were rated the most effective for improving urban traffic problems and freight operations.

TOP FOUR OPTIONS VOTED ON EFFECTIVENESS	BENEFITS OF POTENTIAL OPTIONS GENERATED
1. Congestion Control (Option K)	<ul style="list-style-type: none"> • If congestion alleviated, should improve journey reliability. • Aids Just – In -Time (JIT) operations. • Helps all freight operators, regardless of the size of operation. • Reduced emissions – improves air quality thus bringing environmental and health benefits. • Reduced resource costs – better fuel consumption, more efficient use of time etc. (includes improvements to bus companies operating costs). • Better driving techniques for all vehicles so less stress and reduced excessive braking – brings health benefits (pollution and mental wellbeing) • Fewer complaints about freight operations • Drivers Hours' & Working Time Directive – better use of time, easier to meet set break times etc. • Potential for more efficient use of road space.
2. Improved Engagement (Option D)	<ul style="list-style-type: none"> • Better recognition of needs and limitations of both parties (especially if haulage clients included). • Better identification of major issues to address. • Local Authorities able to be more proactive, encourages more useful responses from industry. • Better understanding all ways round can enable more tailored policies to be produced. • Understanding more possible implications of policies etc. can lead to achieving best practice. • Can give freight operators a more strategic overview. • Generates a broader range of solutions to problems from freight movement. • Reflexive, learning relationship can happen that improves situation for all parties involved. • Ensuring correct person available can draw out better results (need to publicise communication channels).
3. Dynamism of Local Authorities (Option B)	<ul style="list-style-type: none"> • Freight operators would be able to be more flexible in their operations and more adaptable. • Planning applications/processes might be accelerated. • Land, resources etc. would be utilised more effectively and efficiently. • Freight would get a greater and earlier recognition in planning guidance / documents. • Reduces empty /part load running of vehicles

	(improves vehicle fill) <ul style="list-style-type: none"> • Enables easier planning for future needs, ensuring transport sustainability.
4. Education (Option A)	<ul style="list-style-type: none"> • Public would understand the need for freight deliveries better. Also the business decisions that affect the form freight operators take. • May help more collaboration between freight operators to bring forward initiatives that help all.

Table 7-6 Summary of benefits for options generated in Workshop One

With the exception of congestion control (option K), for which many practical benefits were highlighted, such as improved journey time reliability, more efficient use of road space, and better air quality in urban areas; many of the benefits described by the stakeholders for the most effective options complement one another. For instance, by educating people on the importance of freight and its requirements could lead to greater understanding of potential policy implications, thus creating a need for improved engagement between operators and local authorities. Furthermore, by improving the level of engagement with freight operators, a reflective learning relationship could develop, enabling local authorities to be more proactive towards problems and issues that affect the freight industry both now and in the future. The collaborative discussions, from which these benefits were drawn, indicate that joint working between local authorities and freight stakeholders on a focused freight related topic can create consensus driven outcomes.

7.3 Workshop Two

7.3.1 About the workshop and its participants

The second workshop took place on Tuesday 7th February in Rotherham, South Yorkshire between the hours of 08:30 and 12:30. This workshop aimed to attract stakeholder participants from across South Yorkshire, the North Midlands, and the M62 and M1 motorway corridors.

For this workshop individual invitations were sent out by email to people in the region who had already taken part in a research interview as well as to other contacts known to the research team; a snowballing process was also employed to attract relevant stakeholders known to those who had received a personal invitation. In addition, this workshop was advertised through a variety of means including: an advertisement the University website, accessible through my profile page; it was also advertised as a regional event by the Chartered Institute for Logistics and Transport UK (CILT UK); advertisement flyers were also distributed via email to members of Transport for London's Freight Operator Recognition Scheme (FORS) and to members of South Yorkshire based Eco Stars Scheme.

Again, there was a target of ten participants, and although a total of 15 people had booked a place at the workshop, only eight attended on the day. Of the eight participants, four represented local authorities, three represented the freight transport industry, and one was a transport consultant to local authorities (who was placed with the local authorities for the first session on idea generation).

The following table (Table 7-7) shows the key characteristics of the participating local authorities in order of their approximate population size based on the mid-2010 population estimates for UK local authorities (ONS, 2011) together with the nature of the various urban areas within their remit. Table 7-8 lists the industry representatives by the type of organisation and the industry sectors in which they operate.

Local Authority (no. reps)	Approx Population (2010)	Industrial	Major retail sector	Major Service sector activity	Tourism	Port
A (2)	225,000	✓				
B (1)	550,000	✓	✓	✓		
C (1)	7,800,000		✓	✓	✓	✓

Table 7-7 Participating local authorities at workshop two by approximate population size and nature of urban area

Freight Industry / Urban Freight Stakeholder Representative (no. reps)	Type of Organisation	Industry Sector
A (1)	Industrial equipment	Haulage and commercial plant hire
B (1)	Lorry mounted lifting equipment	Construction logistics
C (1)	Cabin hire	Haulage and commercial plant hire
D (1)	Consultancy	Transport consultant to local authorities

Table 7-8 Participants at workshop two representing the freight transport industry by industry sector

7.3.2 Session One – Idea Generation

For the first session the stakeholders were divided into two groups, the red group was local authority stakeholders, of which there were four, and the blue group was for participants from the freight industry. All the participants were asked to (individually) write ideas in response to the following stimulus question:

'In what ways could urban transport policy be amended to improve operations in urban areas that will ease current urban traffic problems?'

The ideas that the individuals generated were then collected through a round-robin style recording of ideas within their respective groups. The ideas gathered from both groups are shown in the following tables (Table 7-9 and Table 7-10) and are written as the participants explained them.

INITIAL IDEAS GENERATED BY LOCAL AUTHORITIES
<ul style="list-style-type: none"> ▪ Time of delivery – e.g. out of hours? ▪ Preferred routes – “Bus lanes”/Dedicated lanes ▪ Promoting freight consolidation centres – promote, incentivise, facilitate ▪ More efficient engagement with industry – understand the issues better ▪ Capture data on – identify problem areas/bottlenecks ▪ More timely and appropriate data, preferred route network, ensure appropriate routes – data updates to sat nav companies to ensure sat nav maps are up to date and HGV friendly ▪ Urban design improvements – better access provision in urban planning ▪ Parking enforcement, commensurate to magnitude of problem ▪ Share best practice - including international ▪ Contact with freight operators ▪ Physical improvements – new roads, junctions ▪ Collate between authorities. ▪ Cleaner, fuel efficient, safer vehicles. ▪ Bigger vehicles on trunk routes ▪ Local authorities as facilitators across regions/areas ▪ Engage with public more ▪ Review drivers hours and WTD

- Enforcement of planning conditions
- Review of trunk roads speed limits (safety)
- Regulations of vans/LGV

Table 7-9 Ideas generated by local authorities in Workshop Two

The main themes that emerged from the ideas suggested by the local authority participants included: amending and improving current restrictions, regulations and infrastructure; engaging and communicating to a greater degree with the public, industry and other local authorities; improving data collected on freight movements in order to more accurately assess freight issues; promotion of initiatives to encourage more sustainable freight, such as vehicle improvements and incentivizing freight consolidation centres.

As part of the round-robin style discussions, the participants in the second workshop engaged in a preliminary discussion in their respective stakeholder groups on the possible impacts and side effects of a selection of ideas put forward.

The idea of altering the time permitted for deliveries in urban areas, for example to allow for out of hours operations (i.e. night time deliveries) would likely have the impact of reducing the number of trucks on the urban road network during peak times, and utilize the less congested city centre roads at night time. A pilot test of allowing off-hour deliveries in Manhattan, New York City found that cost savings were made as a result of better driving conditions that enable faster speeds, fewer parking tickets, and improved fuel consumption (Brom et al., 2011). Although performing multi-drop deliveries at night time raises a number of potential problems. For example, if deliveries are made during the night when retail stores are usually closed, extra staff would be required to receive the goods, thereby raising the cost for retailers (Quak and De Koster, 2006, Brom et al. 2011). Another issue associated with night time deliveries is the extra time required for drivers to unload the goods, since there would be fewer retail staff on hand to assist during the night (Ibid). The large retail chains surveyed by Quak and De Koster (2006) also indicated that they were very much against supplying their stores at night, they point out that drivers left alone at night become an easy target for criminals (especially where high value goods are concerned), which also raises safety concerns. Finally, night time deliveries also create a nuisance during the night for city centre residents (Quak and De Koster, 2006), which could potentially become a problem for local authorities to address.

It was thought that the allocation of preferred routes and making physical urban design improvements would help to reduce levels of air pollution as unnecessary freight traffic

would be directed away from AQMA's. As explained in chapter 6 (section 6.4.6.2) many local authorities are concerned with finding ways to control vehicle emissions and reduce the impact on the environment. However, participants were not certain if trucks would use the alternative routes or how their use could be encouraged. The local authorities also recognised that encouraging freight traffic to use alternative preferred routes through an area could potentially cause an additional cost to operators, in terms of extra distance and or time to travel to use these potentially less direct routes.

The idea of adjusting the levels of parking enforcement commensurate to the magnitude of the problem in a particular location; and enforcing existing planning conditions could positively impact urban areas. Improving the enforcement of parking regulations could reduce the number of illegally parked vehicles that block the traffic, thereby improving the flow of traffic and reducing congestion caused by obstructions in the road. Better enforcement could also reduce the number of illegally parked vehicles in loading bays, keeping them clear for use by delivery trucks. Browne et al. (2007a) highlight the issue of inappropriate use of loading bays following a survey of loading bays in the Paris, which demonstrated that for 47% of the time loading bays are occupied by illegally parked vehicles, empty for a further 47% of the time, and used by genuine goods vehicles for only 6% of the time.

Finally, the local authority group discussed the potential impacts and side effects of promoting freight consolidation centres. There was a strong belief that if more freight was delivered via a consolidation centre that the urban area it services would reap considerable environmental benefits. For example, Browne et al. (2007b) note that local authorities potentially benefit from fewer deliveries in the urban area, and therefore less congestion and improved traffic flow leading to cleaner air and the potential to encourage alternative fuel vehicles.

INITIAL IDEAS GENERATED BY FREIGHT INDUSTRY REPRESENTATIVES
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- | |
|--|
| <ul style="list-style-type: none"> ▪ Create lorry lanes for peak time use or ability/permission to use bus lanes at certain times. ▪ Reduce the cost of the London Congestion Charge for lorries during the weekdays. ▪ Improve bus lanes and locations (they currently finish 10-15m short of traffic lights – trucks need to change lane quickly to turn left but buses won't give way) ▪ Remove WTD for lorry drivers – too many sets of rules. Driving hours, rest breaks and WTD rules – not entirely comparable i.e. WTD introduces a lot of complications for night shift workers, also rules do not match (some EU countries don't adopt it) so stopping in awkward places as a result of current rules. Drivers don't know how to comply with rules. ▪ Increase vehicle gross weight limits (10% more?) Needs to be more flexibility for different load types. ▪ Distribution centres outside main towns and cities – increase number/encourage use so vehicles can access urban areas out of peak times – better use of bus lanes and cycle lanes etc. ▪ Convert normal roads into one way systems – in and out of urban areas. ▪ Better planning for all road works. ▪ Alter LEZ – grades are not economic for vehicle engine standard. ▪ Reduce VAT on fuel (with congestion increasing – more fuel being burned over fewer miles) ▪ Alter/add time windows for freight traffic to access urban areas (re-address where possible) ▪ Re-educate drivers on driving abilities – car drivers, cyclists etc on other road users (medicals for all drivers aged 45+, re-test drivers, revenue generator for government) |
|--|

Table 7-10 Ideas generated by the freight industry in workshop two

Many of the ideas suggested by the freight industry stakeholders were focused on finding ways to improve operational performance through the alteration of restrictions (i.e. weight limits) and the re-allocation of road space; reduction of operating costs currently incurred through charging and taxation schemes. The idea of re-educating

road users and also simplifying Working Time Directive (WTD)⁴ regulations were also suggested. The ideas related to altering restrictions also bear a strong resemblance to the issues discussed by industry respondents in the interviews (Chapter Six, section 6.4.4.2). Three out of the four representatives provide logistics services for the industrial and construction industry sectors, specializing in the movement of industrial equipment, heavy lorry mounted lifting gear and the delivery and collection of pre-fabricated cabins commonly used on construction sites. As such, the possible impacts and side effects of some of these ideas were discussed in the respective stakeholder groups prior to presentation of all the ideas in the first plenary session.

Firstly, the operators discussed the removal of WTD for lorry drivers. The motivation for this idea stems from there being too many sets of rules for drivers and operators to abide by. Operators reported that drivers don't fully understand how to comply with the different rules (driving hours, rest breaks and WTD) and as a result are stopping and parking up their vehicles in awkward and unsuitable locations. According to the operators, the proposal to simplify WTD for lorry drivers could provide everyone concerned with a greater chance of understanding what is actually required of them. However, it is likely that such a move would serve as an incentive for some hauliers to bend the rules, thus putting both drivers and other road users at an increased risk of accidents. Therefore, it may be better to encourage operators to invest more into additional driver training as and when required, to ensure that drivers are able to comply with the rules.

Another idea put forward by freight operators was to increase vehicle gross weight limits. In the UK, the maximum gross weight of 44 tonnes for a truck was introduced in 2001 following an intense programme of bridge checking and road strengthening in the 1990's (McKinnon, 2005). The operators identified two main benefits of further increasing this limit: firstly, increased gross weight limits has the potential to reduce the number of vehicles on the road network as it creates more opportunities for load consolidation; and secondly, by increasing the weight limit of goods that can be moved on one vehicle, overall running costs could be reduced as opportunities for operators to benefit from economies of scale increases. However, McKinnon (2005, p92) points out that as weight limits rise, "an increasing proportion of loads will be constrained by volume (i.e. they will cube out before they weigh out)". It was also noted by operators

⁴ **Working Time Directive (WTD)** is a directive of the European Parliament 2003/88/EC concerning the protection of workers in the European Union against adverse effects on their health and safety caused by excessive working hours, lack of rest or disruptive patterns (London Chamber of Commerce and Industry, 2010). In April 2007, a revised EC regulation 561/2006 was adopted, which outlines driving and working hours of drivers in road transport, in order to improve road safety and working conditions of drivers (Goel, 2010).

that reducing the number of vehicles (by allowing larger loads to be carried) would likely result in driver redundancies as companies reduce the size of their vehicle fleets. The idea of re-educating drivers was also suggested as a way to reduce the number of accidents involving goods vehicles in urban areas; increase driver awareness of the hazards associated with driving in and around urban areas; potentially reduce insurance premiums and insurance claims. This idea resembles the solution proposed by Muñuzuri et al. (2005) that local authorities promote specific training related to city logistics as a way of increasing the skills of drivers and logistics companies. This training would then help to improve the driving behavior of goods vehicle drivers in urban areas and inform them of expected best practices. However, the freight operators highlighted that this solution would incur costs to various parties through not only providing the training but also promoting and enforcing it.

Despite the second workshop taking place in South Yorkshire, the freight operators were concerned about the cost of travelling into and around Central London's congestion charging zone during week days. Therefore, one of the ideas generated was to reduce the LCC charge for lorries on a week day, which would potentially reduce general operating and running costs for hauliers. However, it was noted that this would effectively reduce the authorities' spending capacity as less revenue is earned from the congestion charge. Although a study by Anderson et al. (2005) suggested that depending on the amount vehicles are charged, the improvements in the average speed of goods vehicles (caused by reduced traffic congestion) can for some firms outweigh the congestion charge paid. A second issue raised by the operators with regards to urban transport policy amendments in London was to alter the low emission zone (LEZ). This proposal stemmed from the argument that the current grades are not economical given the vehicle engine standard required. For the firms involved at this workshop, deliveries into the LEZ did not constitute traditional palletized deliveries on standard rigid or articulated HGV's. Instead, their vehicles were specially adapted to carry industrial equipment and site cabins that are delivered to order. Therefore, the operators explained that in order to comply with the LEZ regulations, they are required to prematurely update their vehicles in line with the latest Euro Standard truck engine specification (as discussed in chapter 6, section 6.4.4.1), to enable occasional deliveries into Central London to be compliant. Freight operators at the workshop agreed that altering the LEZ would have the greatest benefits for hauliers, since they would likely receive fewer fines and profit more from running the vehicle for a longer period of time before upgrading it; whilst the government would receive less revenue from the fines. None of the stakeholders present at the workshop mentioned the impact that this proposal would have on the environment, and principally

the LEZ's main objective to improve air quality (as explained in Chapter Two, section 2.4.4). Also, the fact that these London specific issues arose in discussions at the South Yorkshire workshop exemplifies the national reach of some operators.

The idea of creating lorry lanes for use during peak times or permitting lorries to use bus lanes was also put forward by the freight operators. If used correctly, operators believe that it would reduce congestion and the number of accidents involving HGV's in urban areas. Similarly, the idea of developing distribution centres on the outskirts of large towns and cities (often referred to as UCC's) was also discussed by the local authorities and the stakeholders involved in the first workshop. The freight industry stakeholder who suggested it in the second workshop identified the following positive impacts: they would provide convenient access close to the outskirts of city centres for larger delivery vehicles coming off the motorway network; reduce time spent in urban areas; where a congestion charge is payable (i.e. London), operators could reduce the number of vehicles being charged; UCC's provide more employment opportunities for locals; they can be built on brown field sites, thus regenerating parts of the urban landscape; and they also have the potential to induce tax incentives for using them. However, the operators noted that constructing distribution centres in close proximity to an urban centre occupies valuable land and increases the cost of distribution for operators as a result of effectively 'double-handling' the goods, and increasing the total amount of time required to deliver goods to retailers in the urban area.

7.3.3 Session Two – Plenary I

As with the first workshop, the first plenary session provided the opportunity for all the participants involved to discuss and debate the ideas generated by both stakeholder groups, from which a combined list of ideas was produced that would be voted on. The combined list (Table 7-11) was displayed on flip chart paper for the whole group to refer to, and aid the completion of the pre-prepared voting sheets that were used in each workshop. Participants remained in their representative stakeholder group (Local authorities or freight operators) to rate each of the options on the combined list according to:

- a) How effective do you think the action/policy would be?
- b) How acceptable do you find the option to be?

As per the previous workshop participants were also asked to rank the list in order of preference according to their most favoured options. The same scales were used to quantify the responses, as explained earlier in section 7.2.3.

Some of the less popular ideas from the first session were not taken forward and therefore not included in the combined list that participants voted on. From the local authority stakeholders, these included: local authorities capturing data on freight movements in order to identify problem areas; collaboration between local authorities and across regions with regards to freight issues; reviewing speed limits on trunk roads; regulating vans and light goods vehicles (LGV's). Ideas generated by the freight industry that were excluded from the combined list included: reducing the cost of the LCC during weekdays; improving the allocation of bus lanes and their locations, specifically close to traffic light junctions to enable smoother lane changing for left turning trucks; the creation of one-way road systems to take traffic in and out of urban areas along a predetermined route; better planning of road works; and the reducing the VAT (Value added Tax) payable on fuel. There are various reasons for these ideas having been excluded from the final list, such as insufficient agreement from all the stakeholders as to how feasible implementation of them were, and other ideas being too specific to a particular situation or urban area (i.e. London and the congestion charge) and or regarded as outside the control of the local authorities present at the workshop.

The results of the voting session from the second workshop are presented in the following section (7.3.4), along with a discussion that highlights key differences in opinion and areas for potential further collaboration.

Option	Short name	Detailed idea
A	Lorry bans & bus lanes	Create lorry lanes for peak time use or ability/permission to use bus lanes at certain times.
B	Preferred routes	Dedicated freight routes e.g. Using old railway lines in Barnsley and improving junctions etc.
C	Guided freight routes	Turn guided bus routes into a freight concept (successful in Leeds/Bradford area)
D	Time windows	Out of hours deliveries / time windows (need to decide what is out of hours though)
E	WTD	Need to amend for the road freight industry
F	Vehicle weights	Increase vehicle gross weights and space (on trunk roads)
G	UCC's	Establishing consolidation centres on the outskirts of towns and cities
H	LEZ	Cleaner vehicles and more fuel efficient
I	Engagement	Between industry and local authorities to improve, inclusion of freight in transport strategy and data sharing - best practice. Policy needs to take all transport into account
J	Re-educate drivers	Look at their abilities (cycles, HGV's etc) and regulate van drivers / LGV (incorporate drivers hours)
K	Enforcement and Parking	Creating appropriate alternatives, dwell times enforced.
L	Sat Nav's	Real-time data and Sat Nav's for freight industry that are affordable
M	Public engagement	Better engagement with the public about freight issues.
N	Urban design	Urban design improvements - better access and provision

Table 7-11 Combined list of policy options generated in workshop two

7.3.4 Session Three – Preferences for options generated

The following chart (Figure 7-2) shows the results of the participants votes on the combined list of policy options generated (Table 7-11) based upon the level of effectiveness and acceptability of each option, displayed in order of participants preference. As explained in section 7.2.4, the votes were used to calculate the average scores for each option, which were then used to produce the chart.

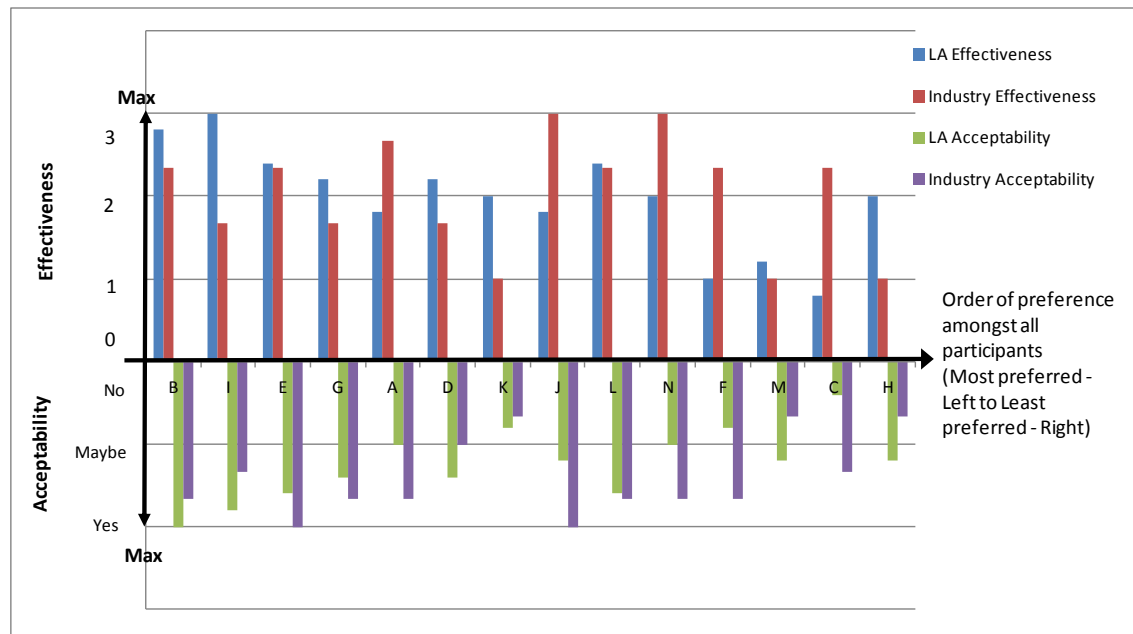


Figure 7-2 Chart showing levels of effectiveness and acceptability of policy options chosen and rated by participants at workshop two

The chart in Figure 7-2 shows that out of all the fourteen options taken forward from the initial idea generation stage, options E (Amending WTD for freight industry) and option L (Providing affordable real-time data through Sat Nav's for the freight industry) achieved the highest level of agreement on both effectiveness and acceptability between the two stakeholder groups. However, neither of these options were the most popular. The idea of creating preferential routes for freight traffic (option B) was the most popular idea proposed for improving operations in urban areas, and although it achieved slightly higher ratings from the local authority participants, this is not surprising since the idea originated from the local authority stakeholder group. It should also be noted that prior to the voting, option B had been accompanied with a practical example of how it could be implemented in practice. One of the local authority representatives suggested that old, disused railway lines in the Barnsley area of South Yorkshire could be used to create routes solely for use by freight vehicles, which would require little new infrastructure to be built. Local authorities also rated option I (improving engagement between industry and local authorities) highly in terms of effectiveness and acceptability, indicating that they recognised the potential for improved engagement to lead towards best practice and freight needs being accommodated in future transport strategy.

In contrast, the least popular option was H (introducing an LEZ to encourage cleaner vehicles and more fuel efficient operations). This option achieved low levels of effectiveness and acceptability from the freight operators concerned, although it is likely that operator votes on this option were biased against LEZ's from the outset due

to the nature of their business as explained in the previous section. It is possible that this option would have achieved higher scores on all scales if the freight operator group at the workshop had been both larger and more varied in the nature of operating sector, since results of a freight operator survey prior to the implementation of a LEZ in London showed that out of fifty respondents, the vast majority either agreed or strongly agreed with the concept (Browne et al. 2005).

Option C (guided freight route concept) and option F (Increased vehicle weights) demonstrated the greatest disparity between the votes of industry and local authorities, with both being favoured more by the freight industry, despite option C initially being suggested by local authorities. The idea of guided freight routes adopts the concept of guided bus routes that have been successfully implemented in the Leeds and Bradford city regions and applying it to urban goods vehicles. If implemented it could result in goods vehicles using the lanes being given priority over other vehicles at busy junctions on the network, which would obviously benefit the freight operators. However, it is likely that local authorities voted against this idea as not only would it mean prioritising goods vehicles over public transport, a potentially politically unacceptable decision, but also it would be a costly measure to implement that involves investing in new infrastructure and causing disruption to the road network in the process. Additionally, there are few urban areas that have the spare capacity on their road network to create a segregated freight lane.

Increasing the weight limit of commercial goods vehicles (option F) was also largely disregarded by local authorities as neither effective nor acceptable. As McKinnon (2005, p93) points out “any new proposal to increase maximum truck [weight] would be very controversial and fiercely resisted, particularly by environmental pressure groups” and therefore it is likely that local authorities do not foresee any merit in pursuing it. On the other hand, the result may imply that freight operators in the UK feel constrained by the current vehicle weight limits imposed, especially when some other EU countries have truck weight limits in excess of 44 tonnes (Ibid).

The industry stakeholders rated option N (improving urban design) and option J (re-educating drivers) as being the most effective out of all the ideas voted on. This could be due to the potential for both these options to have a significant positive and practical impact on freight operations in urban areas. Firstly, design improvements in the urban area to enable large HGV's to have better access and provisions such as suitable loading/unloading facilities were both highlighted by the interviews (Chapter Six, section 6.4.4.2) as impediments to urban freight operations. Secondly, as discussed earlier in section (7.3.2) providing driver training has many practical benefits. The

London Freight Operator Recognition Scheme is an example of how this idea could be delivered in practice. FORS currently offers its members access to a ‘Safer Urban Driving Course’ along with a variety of practical training packages for fleet managers including workshops on how to manage driver training; minimise transport fines and charges; and ways to reduce fuel usage (TFL, 2013).

Option K (Enforcement of regulations and parking restrictions) received the least votes from both groups of stakeholders on acceptability, but scored very well with regards to effectiveness from local authorities. This could be due to local authorities admitting that there is an issue with regards to inappropriate use of loading bays as Browne et al. (2007a) implies (refer to discussion in section 7.3.2). Alternatively, it may be that local authorities regard improving enforcement as a relatively ‘quick-win’ solution that despite the additional financial cost required to employ enforcement officers, also has the potential to earn revenue through the issuing of PCN’s.

7.3.5 Session Four – Plenary II

Table 7-12 summarises the benefits discussed by participants for the top six options that were rated the most effective for improving urban traffic problems and freight operations, although with an equal level of effectiveness, options E, L, and N share third place. As with the first workshop, the participants were re-grouped at this point into two mixed stakeholder groups that included representatives from both local authorities and freight operators.

TOP SIX OPTIONS VOTED ON EFFECTIVENESS	BENEFITS OF POTENTIAL OPTIONS GENERATED
<p>1. Preferred routes, designated routes, disused rail lines – Option B</p>	<ul style="list-style-type: none"> • Existing rail routes are currently under-utilised. • Segregated / priority / uncongested routes. • Allows better journey time estimation • Could be linked to lorry parks. • Preferred/advisory routes could link to information provision – liaising with operators. • Bans on other routes only as a last resort. • Dedicated areas for trucks. • Safer for pedestrians, less accidents. • Saves time and fuel costs • Constant speeds – reduces congestion. • Pollution may be reduced depending on route location • Potential to use a route not wanted for cars, but could conflict with cycle, horse or pedestrians. • Timed deliveries increases reliability • Previously protected routes – may promote cycling on other roads. • Likely to remove big vehicles from residential roads/areas • Perception to be publically / politically acceptable.

<p>2. Improve engagement between Industry and LA's – Option I</p>	<ul style="list-style-type: none"> • Would improve the understanding of each groups needs and help with prioritisation. • Information to help spread best practice. • Needs to take a long term view. • Creates better awareness and learning opportunities as views, problems, desires will get heard by all. • Raises the importance of freight politically and in the public eye (as contact between freight industry and public goes through politicians) • Helps to educate LA's on issues and requirements of freight industry (LA's are reactive, no news is good news) • Opportunity for all LA's to support industry and commerce, and provide infrastructure to necessitate this.
<p>3. WTD (Working Time Directive) – Option E</p>	<ul style="list-style-type: none"> • Allow for more flexibility in scheduling. • Clarity for all – easier to understand • Easier to educate drivers / end users on the rules (can't enforce something you don't understand) • Provides more flexibility for industry operations (snow, road-works, accidents) • Could improve overall network effect – planning stops and rest areas
<p>3. Real-time data and Sat-Nav's for the freight industry– Option L</p>	<ul style="list-style-type: none"> • May allow for re-scheduling en-route. • Provision of current information is important. • More information = more efficient running e.g. real time congestion • Opportunity to mirror the mobile phone network capability and develop other applications e.g. a smart phone app. • Programme static restrictions – low bridges, weight limits (reduces number of vehicles going the wrong way, bridge hits (+costly repairs and road closures), and improves fuel consumption. • Drivers using correct maps • Easier publication of highway closures etc. Into route planning software – street map, multi-map, Paragon etc.
<p>3. Urban design improvements – Option N</p>	<ul style="list-style-type: none"> • Reaps big benefits where possible. • Is there a proper access strategy in the development process? • Planning applications consider freight / transport from beginning, reducing costs – no need to retrospectively consider transport elements, freight is no longer an afterthought • Better road network designed in 1st place! • Less congestion and less time wasting – industry costs reduce + better press • Improved timescales on planning.
<p>4. Re-educate drivers – Option J</p>	<ul style="list-style-type: none"> • Better sharing of available road space. • Less rule breaking! • Knowledge and information to all drivers including 'one man bands' • Trucks and drivers are tested regularly • Van drivers included in training

	<ul style="list-style-type: none"> • Less accidents – safer • Lower insurance premiums • Fuel economy and driver awareness improves • Good PR for good drivers • Potential to win business – commercial benefit.
5. Lorry Bans & Bus Lanes – Option A	<ul style="list-style-type: none"> • Potentially reduced congestion • Less wear and tear on road (more distributed) • Journey time reliability and more deliveries on-time • Less pollution – reduced stopping and starting • Better fuel economy and use of drivers time – more efficient freight journey
6. Time Windows (Out of hours deliveries) – Option D	<ul style="list-style-type: none"> • Big benefits considering the store e.g. less peak traffic – but how acceptable? Costly? • Reducing network congestion • Improved use of time • To be encouraged where possible depending on industry sector • Out of hours – more negatives than positives for industry • See benefits from No. 5 (option A)

Table 7-12 Summary of benefits for options generated in Workshop Two

The national reach of some freight operators is evident from the type of options that were voted the most effective. Such as the benefits from both the call to amend WTD for the road freight industry, and the desire for real-time data to be fed into affordable satellite navigation systems for the freight industry highlight the need for greater flexibility for freight operators to deal with adverse weather, road works and accidents on the road network. The other options voted most effective also have potential nationwide benefits, such as improving levels of engagement between industry and local authorities to create better awareness and learning opportunities from shared views, problems and desires. In addition, the benefits of improving urban design (option N) reiterate the need for the planning and development process to consider freight operations from the outset, which could relieve congestion issues without having to retrospectively deal with freight transport. A number of benefits were also identified from allowing freight vehicles access to bus lanes (option A), which included reducing congestion and pollution levels, as well as more specific benefits for freight operators, namely better fuel economy and improved journey time reliability. Similar benefits for amending time windows and allowing out of hours deliveries were also discussed, however, out of hours deliveries is likely to have fewer positive impacts for industry. Finally the most effective option discussed (option B) also has the potential to reduce pollution and congestion problems, although, actually implementing such a scheme is generally dependent on the willingness of individual local authorities and stakeholders in the area to provide sufficient support for them.

7.4 Workshop Three

7.4.1 About the workshop and its participants

The third and final workshop took place on Tuesday 14th February in Basingstoke, Hampshire between the hours of 08:30 and 12:30. This workshop aimed to attract stakeholder participants from across Hampshire and the South East, the Greater London region, and those accessible by the M25 motorway.

Like workshop two, individual invitations were sent out by email to people in the areas mentioned above who had already taken part in a research interview and to other contacts known to the research team; a snowballing process was also employed to attract relevant stakeholders known to those who had received a personal invitation. In addition, this workshop was also advertised through a variety of means including: an advertisement on the Institute for Transport Studies, University of Leeds website, which was accessible through my profile page; it was also advertised as a regional event by the Chartered Institute for Logistics and Transport UK (CILT UK); and advertisement flyers were distributed via email to members of Transport for London's Freight Operator Recognition Scheme (FORS) and to Eco Stars members in the South East of England.

Again, there was a target of ten participants; although a total of eleven people had booked a place at the workshop, only nine took part. Of the nine participants, four represented local authorities, five represented the freight transport industry.

The following table (Table 7-13) shows the key characteristics of the participating local authorities in order of their approximate population size based on the mid-2010 population estimates for UK local authorities (ONS, 2011) together with the nature of the various urban areas within their remit. Table 7-14 lists the industry representatives by the type of organisation and the industry sectors in which they operate.

Local Authority (no. reps)	Approx Population (2010)	Historic Centre	Industrial	Major retail sector	Major Service sector activity	Tourism	Port
A (3)	1,300,000	✓				✓	✓
B (1)	7,800,000			✓	✓	✓	✓

Table 7-13 Participating local authorities at workshop three by approximate population size and nature of urban area

Freight Industry / Urban Freight Stakeholder Representative (no. reps)	Type of Organisation	Industry Sector
A (1)	Local cycle courier	Parcel courier
B (1)	Nationwide supplier of office products	Commercial distribution
C (1)	Nationwide builders merchants and building supplies	Construction logistics
D (1)	Manufacturer of specialist products to Ministry of Defence	Manufacturing and own-account distribution
E (1)	Consultancy	Transport consultant to local authorities

Table 7-14 Participants representing the freight transport industry at workshop three by industry sector

7.4.2 Session One – Idea Generation

For the first session the stakeholders were divided into two groups, the red group was local authority stakeholders, of which there were four, and the blue group was for the five participants from the freight industry. All the participants were asked to (individually) write ideas in response to the following stimulus question:

'In what ways could urban transport policy be amended to improve operations in urban areas that will ease current urban traffic problems?'

The ideas that the individuals generated were then collected through a round-robin style recording of ideas within their respective groups. The ideas gathered from both groups are shown in the following tables (Table 7-15 and Table 7-16) and are written as the participants explained them.

INITIAL IDEAS GENERATED BY LOCAL AUTHORITIES IN WORKSHOP THREE

- Develop a national urban freight portal showing loading bay and restrictions etc. (combine LA freight maps into one)
- Make sure clear and efficient signage at destinations that match maps/portal information (matrix system? Languages)
- Improve land use planning for deliveries – out of hour's deliveries and improve the land use planning process.
- Encouraging more people to use sustainable transport – reduces congestion and frees up capacity (demand management could be amended – workplace parking levy and road charging) 'Don't need to build our way out of the problem! Just encourage more use of the alternatives!'
- More communication and dialogue and coordination to improve understanding and consistency of freight parking requirements. Enable individual operators and enforcers to understand each other's needs.
- Timescale necessary to implement strategic approaches not matched up with electoral timescale – process takes too long!
- Greater focus on demand management – business efficiency and cost savings
- Sat nav issues and too much reliability on them - make a requirement to update them regularly – HGV's don't use them. Offer free updates?
- Encourage use of public transport – frequency, efficiency, cleanliness etc to free road space – many different ways of organising; join up transport network (better ticketing etc. LA's have an information providing role)
- Dynamic lane management – parking lane in morning peak becomes a bus lane, the freight loading later (booking system), then public parking. Flexible use of road space at different times and better use of space where possible (links into dispensation scheme), dynamic management of curb space.
- Better use of ITS – real time info, in-vehicle and pre-journey planning, info available for better informed decisions.
- Delivery boxes at houses – unattended delivery option (include in planning) out of hour's delivery – need for shop keepers to be present. Assists with van traffic – internet shopping, reduced failed delivery – return trips and re-try, reduces wasted fuel, CO₂ emissions etc.
- Improved delivery preference system in retail sector e.g. Next, use business

rates to incentivise such schemes.

- More focuses on promoting collaboration between businesses and LA's (Chambers of Commerce), need more dialogue between freight operators and policy makers – financial benefit to business of collaboration e.g. reduced purchasing frequency and therefore a cost saving.
- Look at incentivising regulation or hush kits to reduce noise pollution for night time delivery.
- Construction consolidation – urban land use policy, framework and delivery service plans (collaboration to achieve planning process wins).

Table 7-15 Ideas generated by local authorities in workshop three

Many of the ideas listed in the above Table 7-15 can be linked to the following themes: the encouragement of sustainable transport alternatives as a means to reducing congestion on the road network; the use of ITS to gather real-time information and provide the freight industry with up to date information for use with satellite navigation units; alterations to current planning procedures; out of hours and night time deliveries; collaboration or engagement between local authorities and businesses; and freight consolidation schemes. It is perhaps worth noting that given the location of this workshop in the South East of England, where urban traffic congestion is generally higher, it is expected that congestion reduction will be of great importance to the local authorities in the area.

One of the more original ideas put forward in the local authority idea generation session was the development of a national freight portal, a facility that would enable all the details from existing local authority freight maps (i.e. loading bay locations, time of day restrictions, weight limits etc) to be combined in one location accessible by all. Currently in the UK, local authorities provide such information to freight operators through a variety of communication channels including hard copy local area freight maps available to drivers entering the area through a port; or making freight maps available to download from their website. To date however, there exists no single place from which information of this nature that covers the entire UK is available for freight operators.

Encouraging people to use sustainable transport (i.e. cycling or public transport) could help to reduce congestion and free up capacity on the urban road network. The local authorities felt that they could play a key role in improving the frequency, efficiency, and cleanliness of public transport and have the ability to improve the integration of the transport network, thereby encouraging greater use of the alternatives to car travel. It was also suggested the current TDM measures such as road charging or work place

parking levies could be amended to help incentivize public transport. Another idea from the local authority stakeholders was to promote and encourage unattended deliveries by including delivery boxes in residential planning conditions. Edwards et al. (2009, p106) discuss the CO₂ emissions resulting from failed home deliveries and note that “the vast majority of emissions associated with traditional failed delivery arise from the personal trip to the local depot by an individual collecting the missed package”. There are potentially a number of benefits related to this idea, including: minimizing the number of failed deliveries caused by nobody being home to receive them; reduce wasted fuel from second attempt delivery trips and thus reduced emissions; and ultimately may help to reduce the number of vans on the roads.

INITIAL IDEAS GENERATED BY FREIGHT INDUSTRY REPRESENTATIVES IN WORKSHOP THREE
<ul style="list-style-type: none"> ▪ Provision of information – routing and legal loading/unloading (contractual arrangement between authorities and operator) ▪ Enhance out of hours logistics – relax restrictions at off-peak times ▪ Cycle deliveries for 1st and last mile deliveries ▪ Freight vehicles in bus lanes? (Green vehicles or all vehicles?) ▪ Encourage/Incentivise off road parking for deliveries (provision and use) and ensure information is available ▪ More intelligent traffic signal controls ▪ Consolidation centres outside city centre ▪ Controls over noise and emissions ▪ Better info for logistics operators on routing/restrictions from LA's ▪ Public transport investments specifically for major employment sites to reduce car community, to reduce congestion ▪ Organisations to have travel plans to reduce congestion ▪ Better freight consolidation into vehicles to reduce number of trips ▪ Time directional lanes according to time of day and traffic flow ▪ More accurate/precise ETA's negotiated between delivery and recipient ▪ Dispensations for 'essential' deliveries in areas with restrictions ▪ Planning to restrict business growth in residential areas

Table 7-16 Ideas generated by freight industry representatives in workshop three

The ideas suggested by the freight industry (Table 7-16) can be categorized under the following themes: improved information provision and better use of ITS; consolidation centre schemes; sustainable transport alternatives; the re-allocation of existing road space; and adjusting current regulations and restrictions based on the requirements of specific locations.

The freight industry representatives suggested the use of bicycles for the first and particularly last mile of freight deliveries. The idea had not been suggested in any of the previous workshops, however it should be noted that one of the participants involved worked for a cycle courier that currently operates in Cambridge and Central London; and another operator's organisation was involved in London based cycle distribution trial. This is not an entirely new idea, nor is it unique to the UK. In Florida, USA locally produced fruit and vegetables are delivered to customers on a bicycle-towed trailer (Springwise, 2008a); and in France, 'cargocycles' are used for small, frequent deliveries to urban businesses in Paris, Bordeaux, Rouen and Dijon (Springwise, 2008b and c). Urban areas can benefit from encouraging greater use of these eco-friendly, non-polluting alternatives to traditional urban freight distribution.

It was also suggested that the provision and use of off-road parking for delivery vehicles be encouraged or incentivized, as highlighted earlier in section 7.3.2 many urban areas have issues with inappropriate use of existing loading bays. Therefore the idea of incentivizing their use by their intended users may help to eliminate the problem.

7.4.3 Session Two - Plenary I

As per the previous workshops, a combined list of ideas was produced after the first plenary session. The combined list (Table 7-17) was displayed on flip chart paper for the whole group to refer to, and remaining in their representative stakeholder group (Local authorities or freight operators) were asked to rate each of the options (according to effectiveness, acceptability and rank in order of personal preference) using the pre-prepared voting sheets that had been used in each of the previous workshops. The same scales were used to quantify the responses, as explained earlier in section 7.2.3.

Some of the less popular ideas from the first session were not taken forward and therefore were excluded from the combined list of options that participants voted on. From the local authority stakeholders, these included: the requirement to update Sat Nav's and or offer free updates for HGV users (despite a similar option being rated highly effective and acceptable by the participants in workshop two); the development of a national freight portal idea has largely been replaced by information sharing;

improvements to road signs; and incentives or regulations for hush kits to be fitted to vehicles used during the night were also ruled out, despite relaxing the restriction on operations out of hours remaining. Conversely, many of the ideas generated by the freight industry were either included as standalone ideas (e.g. Cycle delivery) or incorporated into a more general option that included a number of smaller solutions. Reasons for some of the local authority ideas having been excluded from the final list, may be that those ideas would have been too costly or potentially difficult to implement; in particular enforcing a requirement for Sat Nav's to be regularly updated, since there are no available statistics to predict the number of HGV drivers actually using them to navigate around urban areas. Other ideas such as the national freight portal may have been left out due to insufficient agreement amongst the stakeholders present as to the viability of the idea in practice.

The results of the voting session from the third workshop are presented in a chart in the following section (7.4.4). The results are accompanied by a discussion that highlights key areas where the stakeholders either strongly agreed or demonstrated clear differences in opinion on the ideas put forward.

Option	Short name	Detailed idea
A	Cycle delivery	Encourage use of cycle distribution for 1st and last mile deliveries.
B	Land use planning	Better use of land use planning to include off-peak deliveries, drop-box, consolidation etc.
C	Business Travel Plans	Use business travel plans to reduce car congestion, encourage employee active travel - delivery servicing.
D	Public transport	Public transport to service large areas so employees switch car to bus/rail etc.
E	Accurate ETA's	Improved delivery reliability and journey times i.e. Amend/specify detail (am/pm? More detail)
F	Unattended delivery solutions	Encouraging/investing in unattended delivery solutions to reduce failed deliveries.
G	Dynamic use of road space	Incorporate a dispensation process, contra flow/ITS traffic signals, freight and bus lanes, local authority incentives.
H	More transport funding	More funding allocated to transport to enable specific solutions and balance priorities.
I	Strategic planning approach	Strategic planning approach - solutions and implementation take longer than average election time therefore improves the political support to implement plans.
J	Freight Consolidation	Improve freight consolidation and introduce consolidation centres where applicable.
K	Improved collaboration	Improved collaboration between industry operators and policy makers and LA decision makers and local parking enforcement (intra and inter)
L	Competitor collaboration	Improved collaboration between industry competitors i.e. Location efficiency
M	Relaxing off-peak restrictions	Relaxing restrictions during off-peak hours.
N	Public sector procurement	Use of public sector procurement.
O	Demand management	Congestion charging, road pricing, workplace parking levy - generated income for other things.
P	Info sharing of regulations	Information sharing of regulations - link back to enforcement.

Table 7-17 Combined list of policy options generated in workshop three

7.4.4 Session Three - Preferences for options generated

The following chart (Figure 7-3) shows the results from the participants' votes on the effectiveness and acceptability of each option on the combined list (Table 7-17), displayed in order of participants' preference.

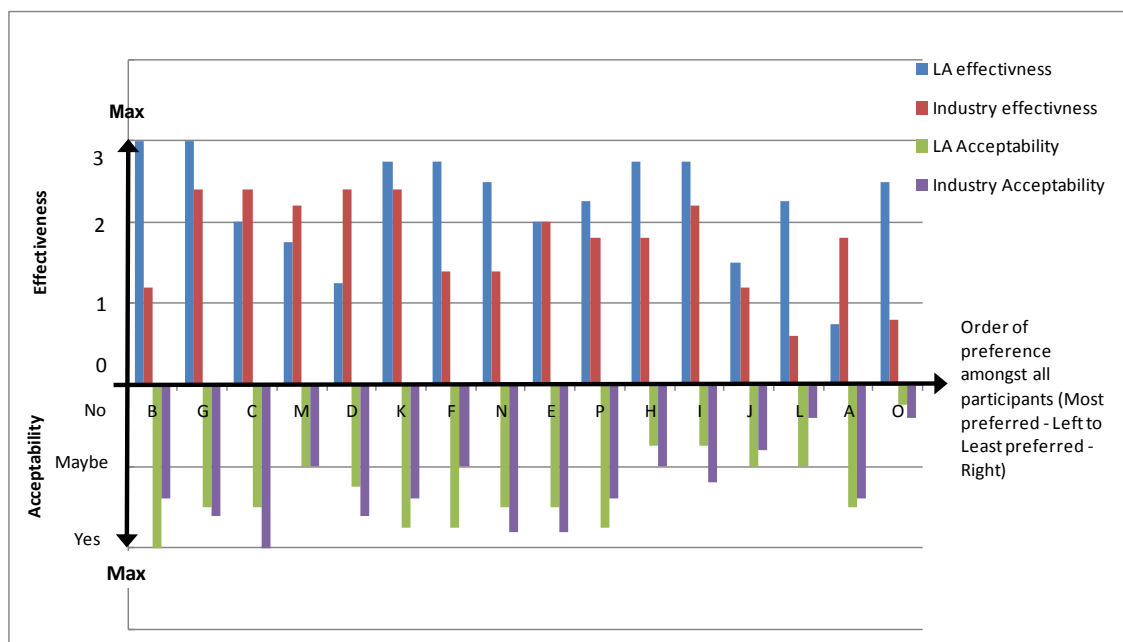


Figure 7-3 Chart showing levels of effectiveness and acceptability of policy options chosen and rated by participants at workshop three

A total of sixteen options were taken forward in the third workshop, more than in either of the previous two workshops. However, the results of the voting session revealed that none of the options achieved close to the maximum satisfaction in terms of effectiveness and acceptability for all of the stakeholders present.

Option B (Better land use planning to allow for off-peak deliveries, drop-box delivery solutions and urban consolidation) ranked the highest in order of preference, although it was local authorities that rated it the highest option in terms of acceptability and effectiveness. This could be due to the implementation of option B being almost entirely in the control of local planning authorities, leaving freight operators to accommodate the decisions made into their urban operations. Whereas industry rated option C (Business travel plans) and option G (Dynamic use of road space) higher on both effectiveness and acceptability, possibly because both of these options could have practical benefits for the freight transport industry nationwide. The introduction of business travel plans would reduce congestion as fewer employees commute to work by car, consequently freeing up road space for delivery and service vehicles. The combination of measures in option G provide local authorities with a variety of ways to make the most efficient use of the available road space, including: shared lane schemes as previously suggested in the earlier workshops and discussed by McLeod and Cherrett (2010); operating a contra flow system that alters the direction of the road lanes according to time of day and traffic flow; and enabling multiple uses for the outside lane, so that it is a bus lane during the morning peak, followed by a loading lane, and later is made available for public parking. Research by McLeod and Cherrett

(2011) has examined the potential for a city centre advanced booking system for delivery and service vehicles, which could reduce problems associated with delivery vehicles parking on kerbs and double parking, thus limiting the number of large goods vehicles operating in the urban centre at the same time.

The lowest ranked option was option O (demand management), which incorporated solutions such as congestion charging, road pricing, and other financial controls that generate revenue for local authorities and central government. This option received a high effectiveness rating from local authorities in particular, but scored the lowest of all the sixteen options in terms of acceptability. Aside for the potential benefits to urban congestion and improved traffic flow in urban areas that has been demonstrated with the London Congestion Charging scheme (Givoni, 2009), the option would likely have a negative financial impact on the day to day operations of freight transport operators (discussed in Chapter Six, section 6.4.7.2).

Despite all the green benefits associated with cycle delivery schemes (option A), they did not appeal very much to the local authorities who rated it the lowest option in terms of effectiveness. Potential reasons for this may be due to the practicalities in terms of the size of load that a cargo cycle can physically transport; the additional cost of transshipping the goods that would likely require a consolidation centre close to the urban centre. Meanwhile industry were perhaps more able to see the benefits of such schemes, rating them much higher on the effectiveness scale. This could be for a variety of reasons that may include: a greater awareness of the practical difficulties experienced from delivering to busy CBD's during the day time; the difficulties finding appropriate parking in close proximity to the recipient's address; the strict time of day access restrictions operating in many urban centres that delivery scheduling has to take into account; the low operating costs associated with cargo bikes since they do not require fuel, or the zero-emissions that makes them perfect for use in a LEZ. Finally, option J (freight consolidation) was rated very low on effectiveness, acceptability and order of preference, although this may be due to the participants at this workshop having little use for a consolidation centre as their goods may already be highly consolidated at regional distribution centres into full vehicle loads. This is supported by Browne et al. (2007b) who explain that fully laden vehicles that are destined for a single retail outlet will not benefit from the establishment of an UCC. Other reasons for the low interest in freight consolidation facilities could be issues of funding such a scheme or identifying a suitable location that would benefit from it.

7.4.5 Session Four - Plenary II

As with the previous workshops, the participants were re-grouped at this point into two mixed stakeholder groups that included representatives from both local authorities and

freight operators. The re-grouping enabled the participants to discuss and debate the potential benefits of implementing the top five options (with fourth place tied between options H and C tied) that were rated the most effective for improving urban traffic problems and freight operations. Table 7-18 provides a summary of the potential benefits discussed.

TOP FIVE OPTIONS VOTED ON EFFECTIVENESS	BENEFITS OF POTENTIAL OPTIONS GENERATED
1. Dynamic use of road space allocation – Option G	<ul style="list-style-type: none"> • Reduce congestion. • Journey time reliability and punctuality, greater on-time delivery. • Increased availability of loading bays and on-street parking. • Reduced emissions and pollution levels. • Better fuel consumption. • Reduced operating costs • Improves business growth (SME's). • Flexibility – waiting times and locations, less rigid defined loading periods, can adjust for optimum network use. • Balancing competing needs – provide for different needs at different times and better use of the existing road network (without having to build extra capacity), and improved flow of traffic (i.e. when not in use – make a red route). • Improved traffic flow ensures better use of traffic light 'green time'. • Fewer PCN's therefore lower transport costs, lower prices, more business value-added and lower cost for LA's processing PCN's? Still needs to be linked to quick granting of dispensations where needed.
2. Improved Collaboration between Industry & LA's – Option K	<ul style="list-style-type: none"> • Better understanding of urban delivery problems and issues for LA's • Policies can be modified to better match operator aspirations • LA's understanding issues in specific districts – funding and budget responsibilities changing • Give and take between operators and LA's therefore more likely to abide by restrictions and respect each other • Opportunity to work in partnership for mutual benefits on particular solutions • Reduce perception that parking authorities work on commission with parking tickets • Passed on extra costs – potential for reduction at consumer end of supply chain • Opportunities for information sharing, LA –more likely to share information than industry – industry avoids sharing due to companies in competition issues. • FQP's – industry don't want purely 'talking shops',

	<p>need tangible benefits to business (needs to provide toolkit to find solutions and act as catalyst for change led by businesses)</p> <ul style="list-style-type: none"> • More effective solutions, less PCN's, more effective dispensation system, less need for enforcement e.g. London – brewery distribution arrangement • Use BID (Business Improvement Development System) • <i>Links to other less highly ranked options M and J</i>
<p>3. Strategic Planning Approach – Option I</p>	<ul style="list-style-type: none"> • Government working in the interest of public who elected it • Longer investment periods – better • More realistic plans for investment • Continuous improvement and step change • Visions more likely to become reality • Flexibility to alter speed limits – through road-works! • <i>Strategic planning link with Land Use Planning (option B)</i> • Can we get cross party consensus? • Increased localism could make strategic planning harder? • Involve business/business leaders more in the planning process • Effective, but a big challenge
<p>4. More funding allocated to transport – Option H</p>	<ul style="list-style-type: none"> • More money to make improvements • Reduce time required to complete a project • More public transport funding – reduces need to invest heavily in infrastructure (better supported, societal benefits – journey time reliability) • Channel funds back to facilitate transport improvements – nationwide broadband to reduce need for travel • Possibility to acquire resources through connecting with other areas of government – NHS? • Funding very difficult but some specific opportunities/initiatives in place • Any chance of hypothecation (e.g. through business rates?) For converting business benefits into transport improvement? • Use PCN and parking revenue for specific purposes e.g. to create off-street parking provision?
<p>4. Business Travel Plans – Option C</p>	<ul style="list-style-type: none"> • Low cost approach to achieving significant solutions • Highlight to all what is available • Encourage cycle and bus to work – improve road network capacity • Ease of access to employment – reduce congestion, health benefits • Travel not looked at in isolation • Easier if estates/facilities management in place in organisation • Focus on business with very marked peak travel times

Table 7-18 Summary of benefits for options generated in Workshop Three

The most effective option for both groups of stakeholders was the idea to make more dynamic use of existing road space (option G). A number of benefits that this could achieve were identified from reduced congestion, emissions and pollution to greater flexibility for operators, increased availability of loading provisions, and reduced operating costs. The second most effective option was improved collaboration between industry and local authorities, which reflects that both stakeholder groups recognize a number of benefits that it would achieve, including opportunities for joint-working to reach mutually beneficial solutions, as well as developing a shared understanding of operational issues and justifications for current policies and restrictions. The third most effective option I, whilst being one of the least acceptable has the potential for achieving continuous improvements and step changes (rather like the incremental approach to transport decision making that was discussed in chapter four), due to potentially longer investment periods.

Finally, option H which seeks more funds to be allocated to transport was joint fourth with option C that suggests businesses develop travel plans. On the one hand, greater transport funds can enable more expenditure on transport related projects for the benefit of multiple users; whereas business travel plans on the other hand were identified as a low cost approach to encouraging greater use of existing public transport to improve congestion. However, option C may be more applicable in areas where there is greater access to alternative transport for commuters, such as Greater London. Overall, each of the five options highlighted as having the potential to be most effective, could have nationwide benefits.

7.5 Comparison of results from all three workshops

Similarities can be observed between some of the themes raised at each of the workshops. The consistencies and commonalities between the different options generated at each of the three workshops are highlighted in the following table. All the options that were voted on in each workshop have been distributed into one of the common themes, and are identifiable from their corresponding letter. For example, improved signage was only mentioned in the first workshop, where it is referred to as option I.

Common themes generated	Options from workshop one	Options from workshop two	Options from workshop three
Education about freight	A	M, J	
Dynamic planning	B		B, I
Out of Hours and off-peak deliveries	C	D	M
Engagement and collaboration between local authorities and industry	D	I	K
Shared use of bus lanes for lorries	J	A	
Urban Consolidation Centres	L	G	J
Improved signs	I		
Greater policy awareness for freight	F, H		P
Dynamic use of road space			G
Sustainable alternatives			D, F, A
Transport funding			H
ITS and Sat Nav's	E	L	E
Travel plans	G		C
Preferred freight routes		B, C	
WTD		E	
Demand management	K		O
Urban design improvements	M	N	
Amending vehicle restrictions		F, H	
Efficiency through industry collaboration			N, L

Table 7-19 Comparison of options generated across all three workshops

By comparing the options generated at each workshop, it can be observed that four themes recurred across all three workshops. These were the idea of introducing UCC's; finding ways to engage more with the freight industry; the use of ITS and Satellite Navigation to provide real-time information to truck drivers; and facilitating out of hours and off-peak deliveries. Despite the local authority stakeholders in the third workshop initially suggesting the requirement to update Sat Nav's and or to offer free

updates for HGV users, these ideas were not taken forward to the vote, whereas a similar option by comparison was rated highly effective and acceptable by the participants in workshop two. Many of the themes that occurred in the third workshop had arisen in some format during the previous two workshops, with the notable exception of encouraging the use of sustainable transport alternatives. This could be due to the large population size of the urban areas within the remit of the local authorities present being large enough to support sustainable alternatives. Although freight consolidation was suggested at all three workshops it did not feature in the list of top rated, most effective options at any workshop. At the third workshop in particular, it was rated very low on effectiveness, acceptability and order of preference, compared with its counterpart options in the other two workshops where it achieved slightly higher votes from participants. This could be due to the final workshop participants having little use for a consolidation centre as their goods are likely to be highly consolidated at regional distribution centers into full vehicle loads.

The following Table 7-20 compares the similarities between the top four options in terms of effectiveness across each of the three workshops.

Common themes generated	Top four most effective options from workshop one	Top four most effective options from workshop two	Top four most effective options from workshop three
Demand management	K (1 st)		
Engagement and collaboration between local authorities and industry	D (2 nd)	I (2 nd)	K (2 nd)
Dynamic planning	B (3 rd)		I (3 rd)
Education about freight	A (4 th)	J (4 th)	
Preferred freight routes		B (1 st)	
WTD		E (= 3 rd)	
ITS and Sat Nav's		L (= 3 rd)	
Urban design improvements		N (= 3 rd)	
Dynamic use of road space			G (1 st)
Transport funding			H (=4 th)
Travel plans			C (=4 th)

Table 7-20 Comparison of top four most effective options across all three workshops

There was only one theme that achieved high levels of expected effectiveness at all three workshops; which was engagement between local authorities and private sector freight stakeholders. This highlights that the stakeholders across all three workshops

recognise the potential for improved engagement to lead towards the sharing of best practice, and ensuring the needs of freight transport are accommodated in future transport strategies. Unsurprisingly, these options achieved consistently high levels of anticipated acceptability across each workshop too. Of the other top rated options, only the themes of dynamic planning and educating people about freight transport were mirrored across two workshops. Firstly, dynamic planning was deemed effective at both the first and third workshops, where in the first workshop it also had a high degree of expected acceptability and was the most preferred option amongst all the participants. Conversely in workshop three, dynamic planning achieved very low level of acceptability from both stakeholder groups, particularly the local authorities, and it appeared very low down the overall ranking in order of preference. Secondly, the theme of educating people about freight also achieved a place in the top four most effective options at the first and the second workshops. In the first workshop, it was the second most preferred option and was deemed highly acceptable amongst all the stakeholders; whereas in the second workshop it was one of the lesser preferred options. Furthermore, at the second workshop it was one of two options that were voted much higher on effectiveness and acceptability by industry participants as opposed to the local authority voters. The only other option at workshop two (that featured in the top four most effective options) where this disparity between the local authority and industry votes occurred was option N (urban design improvements).

As shown in Table 7-20, the themes from which the remaining top four most effective options belonged did not appear at more than one workshop. However, this is mainly due to four of those themes (preferred freight routes; WTD; transport funding; and travel plans) being specific to individual workshops. In particular workshops two and three, where following the group discussions, the participants involved felt strongly enough about the ideas to vote them into the top four options in terms of effectiveness.

For each workshop, the options that were rated overall most effective, were based on the mean score from both stakeholder groups, thereby representing level of effectiveness from a joint participation perspective. Had these results been determined separately for the local authority and industry stakeholder groups, some very different outcomes are likely to have prevailed. This can be seen at workshop one, where the industry representatives rated option J (allowing trucks to use bus lanes) as a highly effective way to alleviate congestion in urban areas. However, this option was not taken forward as it was amongst the least effective options for local authorities. At workshop two, there were a number of options that achieved significantly different levels of expected effectiveness between the two stakeholder groups. If local authorities votes alone had been used to determine the top four most effective options,

urban design improvements (option N) and re-educating drivers (option J) would not have been included. Conversely, these options (N and J) would have been included by industry, along with allowing lorries to share bus lanes (option A). Finally in the third workshop, if local authorities votes alone had determined the top four most effective options they would have included option B (better land use planning for freight) and option F (unattended delivery solutions), neither of which made it into the top four options from joint decision making. Only one of industry's most effective options was omitted from the overall list, which was the idea to establish public transport links to service large areas of employment, thus reducing employees' reliance on the car (option D).

7.6 Evaluation of the facilitated workshops

The purpose of the workshops presented in this chapter was twofold, firstly they were used to test the viability of the method for engaging freight stakeholders in the creation of solutions to urban freight problems; and secondly, they were used to identify potential solutions to urban freight problems through a collaborative and inter-active environment. By using elements of the NGT process, which has not previously been used in transport and logistics research, urban freight stakeholders were brought together to systematically generate potential solutions to an urban freight problem and evaluate their potential for implementation.

As Ritchie (1985) explains, the NGT method produces two main outputs – a list of ideas relevant to the topic being discussed, and a quantified measure of the relative desirability of the ideas put forward. In this case, urban freight solutions provided the general theme for the three workshops that were used to pilot test the adapted method, and the quantifiable measures used were 'effectiveness' and 'acceptability' of the options generated. There is the potential and flexibility for different measures to be used in place of effectiveness and acceptability, depending on the nature of the chosen workshop topic.

The results from the facilitated workshops demonstrate that this process is an effective way of achieving joint participation between local authorities and freight operators. Feedback from the participants at each workshop has been used to evaluate the effectiveness of the workshop method and additionally identify several areas where adjustments could be made to further enhance the process. This feedback is used discussed in greater depth in Chapter Eight (section 8.4), where it is used to evaluate the fourth research aim; reflect on the limitations of the workshop method; and provide the evidence and support for potential further research work.

7.7 Chapter Summary

This chapter has reported on the usefulness of facilitated workshops that were piloted in stage two of this research project to address the fourth and final research aim and its objectives. It has demonstrated how facilitated workshops can be used to successfully bring both public sector stakeholders (local authorities) and private sector stakeholders (freight transport operators) together to openly collaborate on a freight related issue. This enables solutions that will have some benefits for both stakeholder groups to be found through a systematic and collaborative process. These solutions, if taken forward into the planning and implementation phase by a local authority are therefore less likely to be met with a great number of objections during consultation, since all stakeholders have been involved in their creation.

These facilitated workshops have employed a novel method of engaging freight stakeholders in policy and planning issues. They have succeeded in creating a neutral environment that enables a wide variety of urban freight stakeholders to be included; this encourages greater freedom of expression that might not be so easily achieved during a formal meeting of an FQP for instance. The structured schedule of activities also enabled each session to build on the previous, thereby going beyond the traditional discussion type groups that are commonly used to gather together a variety of stakeholder representatives.

The method enabled focus on the central theme adopted for the workshop to be maintained throughout each of the activities, which allowed for a greater in-depth examination of the problems being faced in urban areas as experienced by those stakeholders present. By putting the same tangible problem at the centre of each workshop activity and discussion the likelihood of maintaining the participants' focus and attention throughout is raised; which is one of the challenges that Lindholm and Browne (2013) associate with maintaining successful and ongoing FQP meetings. It is also possible for this workshop method to be modified and used to find solutions to more localised or regional freight issues. This echoes local authorities' perspective on FQP meetings as explained in Chapter Six (section 6.4.3.3) that found themed meetings, such as those established in relation to local quarrying and logging industries to be the most useful from a local authority perspective.

With regards to the question posed at each of the three workshops '*In what ways could urban transport policy be amended to improve operations in urban areas that will ease current urban traffic problems?*' by the completion it was clear that particularly in the first and second workshops many of the final ideas taken forward were very similar. Although, each workshop featured suggestions that involved designating routes for

freight or altering the allocation and or management of current road space to reduce congestion and improve access for freight vehicles. This may be a reflection of the type of freight operator participants involved in the first two workshops, who were predominantly locally based with smaller fleets, engaged in more industrial operations, compared to workshop three that attracted more influential nationwide operators. It is also important to note that whilst there were consistencies and commonalities across themes discussed at each of the three workshops, not all of the suggestions made may be feasible solutions in reality. Local authorities (as explained in Chapter Two, section 2.2) are limited in their autonomy to deal with some types of issues, and hence the creation and implementation of solutions can be difficult, either due to a lack of power or resources available to them. It may also be the case that some of the ideas suggested in the workshops fall outside of local authority control, and therefore either a more realistic compromise needs to be developed or the idea needs to be passed on for consideration by central government.

Therefore, as a potential method that could be used to engage local authorities and freight stakeholders the workshops discussed here could provide a useful and innovate formula. Ideally, a total group size of twelve whereby local authorities and relevant freight operators are distributed evenly would be required to participate in each workshop so as to generate and design good practical solutions to urban freight problems. The current UK system of encouraging stakeholder engagement through FQP's perhaps encourages too much diversity amongst participants to allow this to be carried out successfully.

8 Chapter Eight – Conclusions

8.1 Introduction

This chapter will review how each of the aims and objectives of the research, set out in Chapter One have been addressed; and present the overall key findings and conclusions of the research project. In addition, the limitations of the work will be discussed; along with the identification of suggested areas for further research. This final chapter will conclude with some final reflections on the contribution of the thesis to research.

8.2 Review of the research aims and objectives

8.2.1 Aim One

The first aim of the research was to examine local authorities' understanding of urban freight flows and the consideration given to freight in urban transport policy decision making. Primarily, the semi-structured interviews with local authorities were used to explore the hypothesis that currently local authorities have insufficient knowledge or expertise to plan effectively for urban freight. All of the local authorities were asked about the value of urban freight in their areas, and in general respondents agreed that it has an important role to play in terms of providing employment; servicing the needs of the local community; and contributing to urban regeneration. However, it was quickly established that the majority of local authorities rely on their own local knowledge of freight to feed into transport planning, and rarely obtain any primary data on the volumes of freight or commodities moved through their local area. The findings from the interviews, discussed in Chapter Six also confirmed that individual freight stakeholders are rarely involved in transport policy making processes or invited to formal consultations. Currently, Freight Quality Partnership (FQP) meetings provide the only formal means of engagement between local authorities and the freight industry, and whilst these can achieve successful outcomes for all involved, the difficulty lies in maintaining enthusiasm and momentum for continuing stakeholder engagement (Lindholm and Browne, 2013).

These findings highlight the need for an innovative approach to policy deliberations and decision making that facilitates active engagement from both public and private sector freight stakeholders. As such, methods of engagement need to include more participatory methods that bring together their divergent views. For instance, the satisficing and political bargaining approaches to transport decision making proposed by Meyer and Miller (2001) that were examined in Chapter Four; both have the potential to increase the chances of stakeholders with conflicting interests and goals to

collaborate and reach consensus based decisions, that ultimately lead towards the best compromised solutions overall.

8.2.2 Aim Two

The second aim was to analyse current urban Transport Demand Management (TDM) measures and policies, and establish those that cause the greatest conflicts between policy makers and logistics operators. It was hypothesized that the impact of these measures on urban freight operations is not well understood by local authorities'.

The pre-interview questionnaire for local authorities together with the semi-structured interviews enabled some of the more popular urban TDM measures applied to be identified, and the reasons behind their implementation to be highlighted. Furthermore, it would appear that local authorities' lack understanding of day to day operational issues faced by the freight industry, and of the impact that current TDM measures and policies have on urban freight operations. This is potentially exacerbated by a lack of engagement between the freight transport industry and local authority planners and policy makers.

As explained in Chapter Two, since the 1990's, transport policy and planning has focused on using TDM to address traffic problems resulting from increased inter-urban traffic growth and worsening congestion on Britain's roads (Goodwin, 1999; Banister, 2002). Therefore, TDM includes the implementation of various policy instruments that aim to achieve overarching transport objectives that often go beyond local political issues. Thus, with transport being a complex multi-level policy sector (Marsden and Rye, 2010), the objectives for urban level TDM may originate from national or even European level policy objectives.

Findings from the interviews in Chapter Six on the whole support the hypothesis that the impact of TDM measures on urban freight operations is not well understood. The interviews highlighted that some TDM measures and policies implemented by local authorities were resulting in significant negative impacts for freight operators, which indicates lack of understanding from a local authority perspective. In particular, the effects of delivery time-window policies and restricted delivery times that result in uneconomical and inefficient deliveries to urban areas (Quak and de Koster, 2006) seemed poorly understood.

8.2.3 Aim Three

The third research aim was to create awareness amongst local authorities of the implications that their urban policy decision making has on essential freight movements and operations. The main objectives were to identify the negative implications and understand the wider impact of local authority policy interventions on freight operations;

and to establish the requirements of logistics operators in the urban environment. It was hypothesized that local authorities' are relatively unaware of the significant negative impacts current urban transport policies have on freight. The objectives were addressed primarily through the semi-structured interviews, where primary data was collected to support the literature discussed in Chapters Two and Three of the thesis. In addition, the topic chosen for the facilitated workshops complemented the objective of establishing what logistics operators require for operating more efficiently in urban areas.

Findings from the interviews in Chapter Six suggest that local authorities lack understanding of traditional urban distribution channels, by suggesting a freight modal shift from road to rail as a way of addressing future problems, despite the inappropriateness of rail for distributing goods in many urban areas (discussed in Chapter Three, section 3.2.2). However, it was clear that areas where local authorities were making efforts to better accommodate freight were being largely overlooked by freight operators. This may be because local authorities are targeting areas that freight operators do not perceive as a high priority. Examples of local authority initiatives that fall into this category include freight mapping and improved road signs, as well as encouragement of FQP's for freight issues to be raised. As discussed in the previous section (8.2.2) under the second aim, the lack of understanding at a local authority level leaves planners and policy makers unaware of the impact that current TDM measures and policies have on urban freight operations. However, recognition amongst local authorities of the need for greater engagement and or use of FQP's indicates their willingness to be informed by freight operators as to the impacts of TDM on freight operations.

8.2.4 Aim Four

The fourth and final aim of the research was to create and test a process that enables freight stakeholders to be included in the initial creation and design of future urban TDM measures and policies so that they fully identify and incorporate the needs of urban logistics. This is supported by two objectives. The first is to facilitate collaboration between local authority and private sector stakeholders to address urban freight problems and issues. The second is to understand how engagement between policy makers, freight operators and other urban stakeholders can contribute to the creation of better informed, more effective urban transport policies in the future. The hypotheses are therefore that currently private sector stakeholders have very little input into the design of urban TDM measures and policies and that there is no clear mechanism to ensure effective engagement between public and private sector groups of stakeholders. Therefore the second stage of the research featured the design of

facilitated inter-active group workshops that were piloted in three different locations around England. The workshop method, explained in Chapter Five used elements of the Nominal Group Technique (NGT) to encourage stakeholder collaboration on tackling urban freight problems and issues.

The interviews in the first stage of the research found that some of the interview respondents felt that discussions at current stakeholder meetings (between local authorities and the freight industry) tend to lack focus and direction, which rarely results in the development of solutions to carry forward. This led to the workshop process being constructed around a single focal question, which enabled the stakeholders to collaborate on finding mutually beneficial solutions that could be implemented to resolve the problem. By focusing the workshop theme around one central topic or key question enables the workshops to be an effective use of participants' time, fosters interactions, and leads to a useful meeting outcome.

The findings discussed in Chapter Seven, demonstrate that the facilitated workshop process provides an effective way of achieving joint participation between public sector stakeholders (local authorities) and private sector stakeholders (freight operators). The inclusion of elements from the Nominal Group Technique and Positional Analysis have created a systematic and collaborative process that enables stakeholders with conflicting goals and interests to openly discuss a freight related issue, with the aim of reaching consensus based decisions. Furthermore, feedback from the participants at each workshop highlighted the "good informal environment for discussions" that the process created, which enabled each individual stakeholder the opportunity to voice their opinions and discuss their ideas. In addition, local authorities at the second workshop realised that despite initially generating ideas in respective stakeholder groups, many of their ideas were very similar to those suggested by the freight industry, which illustrates the potential for some degree of consensus between the two groups.

8.3 Key findings resulting from the research

The following key conclusions have been drawn from the combined results of the literature review, interview findings and outcomes from the three workshops.

8.3.1 Facilitated inter-active workshops have the potential to complement the existing FQP process

In the UK, FQP's have been supported by the national government as a means of addressing the identified gaps in communication between public and private sector stakeholders. However, as pointed out in Chapter Two and Three, those coordinating the FQP meetings (most often local authorities) are at liberty to choose who to invite to

participate, and to set their own agenda for meetings. As such, it is often the case that individual freight operators and businesses rarely attend, with the private sector instead represented by trade associations, such as the Freight Transport Association (FTA) or the Road Haulage Association (RHA).

The facilitated inter-active workshops thus complement the existing FQP process by providing individual, private sector freight stakeholders the opportunity to be involved in addressing particular freight problems and issues. As such, it is anticipated that the outcomes from the workshops can be used to complement discussions at FQP meetings, and for issues arising at FQP's to be taken into a workshop to be discussed and examined in greater detail.

However, in Chapter Six, the interviews with both local authorities and freight industry representatives suggest that FQP's are under-utilized as a mechanism for engagement. Only half of the local authorities were actively involved with an FQP or similar freight forum, and the remainder had either chosen not to set one up or had disbanded their partnership. Amongst the reasons cited for their dis-engagement were perceived lack of interest from freight operators, and difficulty arranging meetings. This would suggest that if some local authorities are struggling to attract private sector freight stakeholders to FQP meetings, this could potentially lead to similar difficulties with attracting a sufficient balance of public and private sector representatives to a facilitated workshop. This highlights the importance of identifying a core set of engaged and interested participants, which can be a deciding factor in achieving successful long term engagement between stakeholders (Lindholm and Browne, 2013).

The use of the workshop process should therefore be carefully planned, and not over-used, so as to avoid potential boredom from too frequent repetition of the process that could result in participants losing interest. They may be most useful if used occasionally, bi-annually or as and when required to address a particular problem or recurring issue from the FQP meetings.

8.3.2 Facilitated inter-active workshops can generate shared understanding of solutions and priorities

Findings from the interviews in Chapter Six have shown that urban freight stakeholders have few opportunities to engage with local authorities and to positively contribute to transport policy decision making. Currently in the UK, the only forum that attempts to formally bring these stakeholder groups together is FQP's. However, as some of those interviewed pointed out, many FQP's are regarded as purely "talking shops" or discussion groups on freight related topics, that from an operators perspective rarely appear to result in anything tangible.

The three workshops reported on and evaluated in Chapter Seven have demonstrated how urban freight stakeholders (local authority transport planners, representatives from freight transport operators, local businesses etc.) can be brought together to not only improve their understanding of each other's objectives; but also to work together at finding practical solutions to urban freight problems that have the potential to benefit all stakeholders involved. That way the stakeholders are able to pool their ideas and work together at examining ways of solving the problem, so that by the close of the event the local authorities are able to leave with a prioritized list of the top rated potential solutions or options to consider and further investigate the feasibility of implementing. This process of interactive stakeholder engagement and problem solving means that the ideas and potential solutions carried forward are those that have achieved the most consensus and support from all the stakeholders involved in the workshop, and therefore should any of them reach a consultation phase of the policy planning process they will be less likely to be met with severe opposition from the private sector.

For example, urban freight consolidation was discussed at all three workshops, however the results of the voting sessions did not place it in the list of top rated, and most effective options at any workshop. It achieved a particularly low rating at the third workshop, which is possibly due to the majority of industry participants present having little use for a consolidation centre as their goods are likely to be highly consolidated at regional distribution centers into full vehicle loads. This result was particularly unexpected given that both local authority and industry stakeholders interviewed in the first stage of the research (Chapter Six, section 6.4.7.1) had expressed positive interest in the establishment of UCC's where significant benefits can be demonstrated.

There was only one workshop theme that achieved consistently high levels of expected effectiveness and anticipated acceptability at all three workshops; which was encouraging more engagement between local authorities and private sector freight stakeholders. This highlights consensus between the stakeholders across all three workshops in recognising the potential for improved engagement to lead towards the sharing of best practice, and ensuring the needs of freight transport are accommodated in future transport strategies. Furthermore, this reinforces the recognition amongst both types of stakeholder that communication and engagement is important; and that the current lack of engagement between them (discussed in Chapter Six, section 6.4.3) needs to be addressed.

8.3.3 Creating a collaborative environment is important

Findings from the semi-structured interviews discussed in Chapter Six highlighted that of the private sector stakeholders interviewed, those that had attended any kind of forum or meeting with local authority transport planners often described their

experiences as a “waste of time”. The main reasons for this often included: the local authority organising the meeting, leaving operators feeling “outnumbered” and with limited time and attention paid to their points of view. However, despite these negative feelings towards engaging with local authority planners and policy makers, it was clear that many operators remained optimistic and would be willing to attend forums or events in the future, especially if these meetings were going to enable a more two-way discussion. The workshop formula created during this research has developed a potential new approach for bringing together freight stakeholders into a collaborative environment that fosters joint participation to address freight related problems and issues.

In addition, the collaborative environment created at each workshop that encouraged open discussions and joint-working between stakeholders with conflicting interests could be attributable to the inclusion of a neutral facilitator. Observations at each of the workshops appear to support the idea that a neutral or third party chair persons or facilitator can lead to greater consideration of ideas from all those involved. This is potentially a problem at an FQP, where usually one stakeholder, often a local authority who is responsible for organizing the meeting takes the lead. If the inter-active freight workshop process were to be adopted, there is potential for an industry association or similar perceived neutral third party, perhaps an academic or an independent transport consultant to act as a neutral facilitator for the process.

8.4 Practical recommendations for further development of the workshops

The evaluation forms completed at the end of each workshop also highlighted several areas where adjustments could be made in order to improve the overall effectiveness of the process. These are discussed in the following sections.

8.4.1 Workshop duration

Although half-day workshops were used to trial the method, the structured schedule of activities has the potential to be expanded into a full day workshop. The additional time would enable longer discussion sessions; time for the facilitator to calculate all the results as opposed to just the effectiveness rankings; and additional time for the final session to examine the potential disadvantages and costs associated with the top rated options. Some of the feedback received also pointed out that if additional time was allocated for discussing the options generated, the number of options carried forward into the voting session could be further reduced. On the whole, feedback received through the evaluation forms indicated a general willingness amongst participants to take part in a longer, potentially full day workshop. This shows that not only are

representatives from both stakeholder groups willing to collaborate in the interactive environment that is created by the process, but also that this is a meaningful activity that is worthy of stakeholders time.

8.4.2 Workshop timings

The minor modifications highlighted in the feedback also included amending the start time of workshops, reconsidering the time of year so as to maximise the number of potential industry participants, and the inclusion of more breaks throughout the schedule. Central to achieving successful joint participation through the facilitated workshop process is ensuring that there is a good balance of stakeholders taking part. However, since there last minute cancellations at each of the three workshops, particularly from the freight industry, which suggests that not only is the time of day an important consideration, but also that there are certain times of year when stakeholders may be more available to take part in engagement activities. For example, at workshop one, fewer operators were able to attend, possibly due to the event being held in early December, that is considered to be one of the busiest months of the year for the freight transport industry (Cherrett et al, 2012; Allen et al, 2008).

Further feedback from the first workshop also suggested that an 8am start was too early, and as such this was revised to 8:30-9am for the following two workshops. However, since freight transport operators are at their busiest during the mornings, dispatching vehicles for peak delivery periods that are typically between 05:00 and 09:00 for foodstuffs, and 06:00 until 12:00 for general merchandise (Cherrett et al, 2012; Allen et al, 2008); afternoon workshops could potentially attract a wider range of freight stakeholders to be involved. Similarly, the day of the week is also an important factor for attracting industry participants, since Cherrett et al (2012) noted that Friday's are generally the busiest day, whilst Monday is often the quietest. Therefore, in order to maximise the success of joint participation, involvement from both local authorities and freight operators is required; and so it is important to consider and agree a mutually convenient time and date for a workshop to take place.

8.4.3 Workshop organization

The other amendment to the process that was highlighted by the feedback was to include more breaks throughout the event. This echoes a point made by Phillips (2006, p9) who highlighted that there should be a continuous supply of refreshments available at the back of the room during a decision conference (discussed in chapter four) so that a "facilitator can call breaks as milestones are reached". Although Phillips (2006) is referring to decision conferencing, the principal of providing refreshments during a participative event still applies. This simple adjustment would enable longer discussions to take place, as breaks can be taken as and when they naturally occur,

without being fixed to pre-defined times arranged with the venue; and it would also create additional time for networking, since many of the participants commented that the workshops also provided a “useful networking opportunity”.

8.4.4 Workshop facilitation

Observations from the workshops also highlighted the importance of the facilitation task in achieving successful stakeholder collaboration. As such, the role of the facilitator is an important factor in the successful outcome of the interactive workshop process described in this thesis. The facilitator’s role in the process is to help create the unbiased environment for open discussions amongst the participants, to ensure that each participant’s views are taken into consideration and that no individual participant dominates the discussion, to ensure discussions remain focused on the stimulus question, and to ensure that all stakeholders in the group have the opportunity to contribute so that ultimately an effective stakeholder dialogue results from the workshop. Therefore an appropriate independent facilitator would need to demonstrate a number of attributes, including: a lack of bias or neutral position in relation to both stakeholder groups involved; the ability to motivate participants; and the ability to control group discussions to ensure that all participants have equal opportunity to contribute their ideas.

8.4.5 Extending the scope of the workshops

The interactive workshops that have been developed in this thesis for use on addressing urban freight transport problems and issues have the potential to be applied more widely in urban transport planning. However, as the process has only been tested on a relatively small scale, over three freight workshops, further research would be needed to investigate potentially suitable problems or issues that the process could be used to address. Similarly, the workshops have only been applied and tested on urban freight issues in the UK. Therefore another potential area for further investigation may be to identify other countries where they could be used, and to trial the interactive workshop format on urban freight problems there, thus demonstrating the transferability of the process outside of the UK.

8.5 Limitations of the research

Recruitment of participants for both the semi-structured interviews and the three workshops hosted was constrained by the availability of potential participants and difficulty accessing the most appropriate participant recruitment channels. This meant that slightly fewer interviews were conducted than had been initially targeted, however as responses to the interview questions continued to fall into similar themes it became clear that a point of data saturation had been reached, whereby the occurrence of new information being collected was becoming much less frequent. Although, the findings

from these interviews are limited since they are subject to interpretation by the researcher, and only capture the views and opinions of those interviewed during a particular snapshot of time.

Similarly, each workshop had aimed for a total of ten to twelve participants, with equal numbers representing each of the two stakeholder groups. However, neither maximum attendance of participants nor equal numbers of freight operators and local authority stakeholders was achieved at each workshop. In some circumstances this was due to the timing of the workshops as explained earlier (Section 8.4.2), where for example workshop one was held in early December and was well attended by local authorities, although many of the industry stakeholders that had signed up to attend did not make the event. This is most likely due to the run up to Christmas being a busy time of year for the transport industry and sparing individuals' time to attend the workshop was difficult. This has highlighted that in order to maximize attendance from both stakeholder groups, the time of year or season is an important factor to consider in planning and organising a workshop of this nature.

In addition, the findings presented in this thesis are based on a relatively small sample of twenty two semi-structured interviews (and their accompanying pre-interview questionnaire), and the results from only three, half day workshops. Although every effort has been made to capture the opinions from a variety of individuals in both local authorities and the logistics and freight transport industry the small sample is intended to be as representative as possible of the stakeholders at the time of the interviews.

Although the interview study in stage one produced sufficient findings to support the hypothesis that there is a need for the design of a process that facilitates effective engagement between public and private sector groups of stakeholders, and enables the private sector to have some input into the design of urban TDM measures and policies. Since only three half day workshops were held to pilot test the process, a number of further workshops would need to be held in order to further evaluate the effectiveness of the process, and possibly incorporating some of the minor adjustments highlighted in section 8.4 to further refine the format.

8.6 Identification of further research

This section reflects on the research carried out, and based on the results, presents some opportunities for further research. By drawing on some of the limitations of the study, as well as insights from the practical recommendations for further development of the workshops it is also possible to identify some areas where this research could initially be expanded and enhanced. This is followed by discussion of suggested areas for further work that relate to the broader implications of the research.

Firstly, in stage one of the research, the number of participants interviewed could be increased to include a more diverse range of freight stakeholders. This would strengthen the analysis of how different types of operators are affected by existing urban TDM measures and policies. Similarly, involving more local authorities would enable greater comparisons between freight operations and issues in different types of urban areas. Secondly, further work would provide the opportunity for more workshops to be carried out with a wider variety of stakeholders and in different locations. In addition to the findings regarding the workshop design and how this approach could be extended and applied, the following implications emerged. It may be possible to amend the timings and duration of the workshops as suggested in section 8.4 and further refine the process, as a longer workshop could enable longer discussions, a potentially shorter more refined list of options to vote on, and additional time to include a discussion on expected levels of acceptability.

The findings from this thesis on realising the benefits of integrating freight logistics into urban TDM measures and policies have brought to light three main areas for further research. These include: continued developments of a way to ensure that local authorities more fully understand the wider implications of TDM measures and policies on freight operations; the possibility of utilising advancements in technology to better inform local authorities about freight flows in their area; and finally to further investigate perceived levels of consensus amongst key stakeholders.

Literature in Chapter Two discussed a selection of TDM measures and policies that are commonly implemented in urban areas by local authorities. This discussion highlighted that despite having a generally positive impact on the general transport system, many of these measures can have negative impacts on freight operations. As such, the second research aim hypothesized that local authorities do not fully understand the impacts of such measures on urban freight, which is supported by the findings in Chapter Six. This creates an opportunity for further research to investigate whether it is possible to demonstrate the benefits and costs of different TDM measures to all relevant stakeholders in the system, thus enabling local authorities to be better informed about the likely wider impacts of their decision making.

In Chapter Six it was reported that only three local authorities out of the twelve that were interviewed were confident about their ability to manage freight, and only half of those interviewed felt well informed about freight flows in their local area. Establishing this knowledge amongst local authority makers is an important step towards integrating freight logistics into urban TDM measures and policies. Therefore, the second area of further research could examine the possibility of using technology such as satellite

navigation and GPS tracking devices to feed information such as travelling times, type of vehicles, loading / unloading dwell times, routes frequently used etc. into an accessible database linked to the internet. This could provide local authorities with better access to information about the nature of freight flows in their area that they can use to create better informed policies.

Finally, further research could examine in greater depth whether there really is consensus of opinion amongst the wide range of freight stakeholders. Both the interactive workshops and the semi-structured interviews carried out in this research project have highlighted the need to identify all the relevant stakeholders in urban freight transport decision making. Thereby defining and categorizing who should be required to participate in an interactive freight workshop.

In order to recommend the interactive workshop process as a method for local authorities to work together with urban freight stakeholders, to find mutually acceptable ways to alleviate common problems that affect or are affected by urban freight operations, it would be beneficial to trial the approach in a case study environment. This is supported by feedback from some workshop participants, who suggested that the process could be used to develop tailored solutions for a specific town or city, thus local freight stakeholders could be invited to participate. This would enable a workshop group to tackle very real issues in a particular area, and for the local authority involved to demonstrate how the ideas and suggestions can be taken forward for further consideration and their potential implementation. This would help to justify that the workshop process is a reliable way of producing workable solutions that have the potential to benefit in some way, all of the stakeholder groups that took part in creating them. If further research were to host more workshops it would be possible to test the method with a range of different questions or problems.

8.7 Final reflections

This thesis has highlighted through the use of semi-structured interviews, the importance of engagement and communication between urban freight stakeholders and their requirement for a process to facilitate informed productive discussions so that they can better understand each other's objectives. Results from three inter-active facilitated workshops created to address this need, demonstrate that the process provides an effective way of achieving joint participation between local authorities and freight operators in a collaborative process that aims to produce consensus based decisions.

Local authorities hold the keys to implementing solutions to the problems of urban freight transport, as they have what appears to be a huge influence on urban freight

operations. However, “there are few contributions considering policies of city logistics aimed at commercial activities explicitly” (Stathopoulos et al. 2010). In the mean time, the freight transport industry is accommodating current urban transport policies, which do not necessarily enable the most effective and efficient means of distributing goods in urban areas. Hence, from the findings of the interviews, it would seem that both parties could seek to benefit from improved collaboration and communication in the future, as it is important that these stakeholders views are heard as currently “little is known regarding the attitude of receivers towards policy measures and how they are...to react to policy scenario changes” (Stathopoulos et al. 2010).

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Appendices

Appendix I – Interview Information Sheet

INFORMATION SHEET

The benefit of integrating freight logistics into urban transport demand management measures and policies

You are kindly invited to take part in an interview for the above named research project. Please take some time to read through the following information carefully, before deciding to take part. It is important for you to understand the purpose of the research and what it will involve. If you require any further information, please do not hesitate to contact me.

The Project

The research involves understanding the current pattern of urban transport policies and transport demand management (TDM) measures, and it will be examining how these match the objectives of policy makers. In addition it will examine the suitability and implications future policies may have on urban freight movements. It is hoped that this work will create a deeper awareness of the implications that urban policy decision making has on essential freight movements.

Participant Selection

Participants are being recruited from two distinct sectors, the first are representatives from Local Transport Authorities across the UK, and the second are representatives from within the UK transport industry, namely logistics companies who undertake a large proportion of their operations in urban areas making deliveries or collections.

Involvement in the research

Taking part in the research is entirely voluntary and you may choose to discontinue or withdraw from the research at any time without providing a reason.

The research interview will involve a combination of open and closed questions, and a short pre-interview questionnaire (which should take around five minutes to complete), both of these will relate to your local authority or area of business. The interviews will either be conducted in-person or over the telephone, whichever is most convenient for you and should last for approximately one hour.

With your consent, it is intended that the interviews will be audio-recorded. The recordings will be used for analysis and to aid transcription of the interview material.

Data protection and Confidentiality

All personal information gathered during the course of the research project will be kept strictly confidential, and you will not be identified personally in any reports or publications that result from this work.

The audio recording made during the interviews will be used for analysis and transcription purposes only, no other use will be made of them without your permission and no one outside the project will have access to the original recordings.

Dissemination of Results

The results of this research will be written up in my doctoral thesis, and hopefully published in academic journal articles. As stated above, you will not be identified personally in the published work.

Further Information

If you require any further information, please contact either myself or my supervisor.

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You will be provided a copy of this information sheet and a signed consent form to keep.

Thank you for taking the time to participate in this research project.

Appendix II – Local Authority Pre-Interview Questionnaire



UNIVERSITY OF LEEDS

URBAN TRANSPORT POLICIES
PRE-INTERVIEW QUESTIONNAIRE

Completing this questionnaire should take approximately 10 minutes. It can either be completed on-screen electronically or alternatively on a hard printed copy.

SECTION A: ABOUT RESPONDENT

- 1) Name of Local Transport Authority
- 2) What is your position/role in the organisation?
- 3) Approximately how many years experience have you had in this role? Years

SECTION B: GENERAL VIEWS ON EXISTING POLICIES

- 4) In what order do you feel your authority places priority on the following policy

Improving Quality of Life for transport users	-	Maximising overall economic competitiveness & productivity	-
Reducing environmental impacts to mitigate climate change	-	Promoting greater equality of transport opportunity for all	-
Contributing to better life-expectancy (road safety)	-	Maximising revenue generation	-
Improved air quality through reduced transport emissions	-		

areas?

(Please select your top five objectives below. Put 1 against the most important, 2 against next most important, and so on down to 5, for the least important)

- 5) Overall, how effective do you think your authorities policies are at supporting efficient freight operations? *(Please tick your response on the scale below)*

Very Effective	Effective	Neither Effective nor Ineffective	Ineffective	Very Ineffective
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

- 6) How much do you understand freight flows in your area overall? *(Please tick your response on the scale below)*

Understand Completely	Understand Somewhat	Not Sure	No Understanding
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

7) Which Transport Demand Management measures and Policies are currently in operation?

(Please tick all that apply)

	Central Business District	Inner Urban Area	Outer Urban Area	Rural	N/A
Parking guidance systems	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Controlled Parking Zone (CPZ)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Urban High Occupancy Vehicle (HOV) Lanes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Low Emission Zone (LEZ)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Vehicle Weight Restrictions	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Intelligent Signage	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
No car lanes / Shared Bus & freight lanes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Urban Road User Charging	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Time of day restrictions	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
One-way Systems	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Vehicle Length Restrictions	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Reversible Lane Systems	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Lorry Bans	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Parking Information Systems	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Loading Restrictions	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Bus Lanes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Freight Quality Partnership (FQP)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Vehicle Height Restrictions	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Lorry Management Zones	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Traffic Calming Measures	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Lorry Routes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Urban Traffic Control Systems (e.g. Scoot signal control)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Park & Ride Facilities	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Waiting Restrictions	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Others (please describe below)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Others:

SECTION C: VIEWS ON FREIGHT POLICIES

8) What are the barriers to effective freight policies being implemented in your area of influence?

(Please tick all that apply)

Lack of appropriate data	<input type="checkbox"/>	Lack of finance	<input type="checkbox"/>
Insufficient operator engagement	<input type="checkbox"/>	Acceptance amongst retailers	<input type="checkbox"/>
Political Support	<input type="checkbox"/>	Enforcement difficulties	<input type="checkbox"/>
Pressure groups	<input type="checkbox"/>	Not sure what works best	<input type="checkbox"/>
Lack of resources	<input type="checkbox"/>	Others (please describe below)	<input type="checkbox"/>

Others:

More often than not, the capacity of delivery vehicles is under-utilised, and one way to improve this is by introducing consolidation schemes, such as urban consolidation centres (UCC's). These aid maximising vehicle fill and facilitate consolidated deliveries to specified geographic areas, ranging from single sites to entire urban areas.

10) Has an UCC ever been considered for your area? *(please tick your response below)*

Yes	<input type="checkbox"/>	No	<input type="checkbox"/>
-----	--------------------------	----	--------------------------

11) Which of these objectives do you think an UCC would aim to achieve? *(Please tick all that apply)*

To reduce carbon footprint	<input type="checkbox"/>
To improve urban freight distribution	<input type="checkbox"/>
To improve air quality	<input type="checkbox"/>
To reduce urban congestion	<input type="checkbox"/>
To increase retail vitality	<input type="checkbox"/>
Other <i>(please describe below)</i>	<input type="checkbox"/>

Other:

12) What would be the main reason for a local authority not establishing an Urban Consolidation Centre? *(Please tick one)*

Funding issues	<input type="checkbox"/>	Political sensitivity	<input type="checkbox"/>
Ownership issues	<input type="checkbox"/>	User uptake	<input type="checkbox"/>
Management issues	<input type="checkbox"/>	Doesn't meet local policy objectives	<input type="checkbox"/>
Location issues	<input type="checkbox"/>	Other	<input type="checkbox"/>

Other:

SECTION D: SUMMARY

13) Are there any specific issues that relate to transport demand management measures and policies aimed at urban freight, which you think should be discussed in the forthcoming interview?

(This helps ensure maximum benefit is gained from the interview meeting)

PLEASE RETURN THE COMPLETED QUESTIONNAIRE BY EMAIL OR POST TO:

Miss Erica E F Ballantyne

Institute for Transport Studies (ITS)
34-40 University Road
University of Leeds
LEEDS
LS2 9JT

Email:
tseefb@leeds.ac.uk

THANK YOU FOR YOUR TIME, I LOOK FORWARD TO SPEAKING WITH YOU SOON

Appendix III – Freight Industry Pre-interview Questionnaire

URBAN FREIGHT TRANSPORT
PRE-INTERVIEW QUESTIONNAIRE

Completing this questionnaire should take approximately 5 minutes. It can either be completed on-screen electronically or alternatively on a hard printed copy.

SECTION A: RESPONDENT DETAILS

- 1) Name of company/organisation:
- 2) What is your role/job title?
- 3) How many years have you worked in the transport and logistics industry?
Years

SECTION B: ABOUT THE ORGANISATION

- 4) What would you consider to be your core business? *(Please tick one)*

Manufacturing	<input type="checkbox"/>	Consolidation	<input type="checkbox"/>
3 rd Party Distribution	<input type="checkbox"/>	Representation	<input type="checkbox"/>
Mail	<input type="checkbox"/>	Maintenance/Serviceing	<input type="checkbox"/>
Other <i>(please describe below)</i>	<input type="checkbox"/>		




Other:



- 5) Which sectors does your organisation operate in? *(Please tick all that apply)*

Drinks logistics	<input type="checkbox"/>	Temperature controlled	<input type="checkbox"/>
Food Logistics	<input type="checkbox"/>	Manufacturing	<input type="checkbox"/>
Courier / parcel services	<input type="checkbox"/>	Trade body	<input type="checkbox"/>
Consolidation	<input type="checkbox"/>	Utilities	<input type="checkbox"/>
Apparel/fashion logistics	<input type="checkbox"/>	Waste management	<input type="checkbox"/>
Brewing	<input type="checkbox"/>	Pallet network	<input type="checkbox"/>
General Merchandise	<input type="checkbox"/>	Construction logistics	<input type="checkbox"/>
Bulk haulage	<input type="checkbox"/>	Other <i>(please describe below)</i>	<input type="checkbox"/>

Other:

- 6) What type of vehicles make up your fleet? *(Please tick all that apply)*

Light Goods Vehicle (long wheel base van) 	<input type="checkbox"/>	Platform trailer	<input type="checkbox"/>
Light Goods Vehicle (short wheel base van) 	<input type="checkbox"/>	Curtain sided	<input type="checkbox"/>
HGV – 	<input type="checkbox"/>	Box trailer	<input type="checkbox"/>

Artic			
HGV – Rigid 	<input type="checkbox"/>	Drays	<input type="checkbox"/>
Draw-bar trailer 	<input type="checkbox"/>	Tanker	<input type="checkbox"/>
Other (<i>please list below</i>)	<input type="checkbox"/>	Temperature controlled	<input type="checkbox"/>

Other:

7) How many vehicles are operational in your fleet?

SECTION C: URBAN LOGISTICS

8) In which of the following places do your vehicles currently operate? (*Please tick all that apply*)

Central Business District	Inner Urban Area	Outer Urban Area	Inter Urban trunk road network	Rural	N/A
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

9) How often do your vehicles make town and city centre deliveries?

Multiple times per day	Daily	2-3 times a week	Weekly	Fortnightly	Monthly	Less Often	Never
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

SECTION D: SUMMARY

10) Do you have any specific issues relating to urban deliveries that you think should be discussed in the forthcoming interview? (This helps ensure maximum benefit is gained from the interview meeting.)

Please specify:

PLEASE RETURN THE COMPLETED QUESTIONNAIRE BY EMAIL OR POST TO:

Miss Erica E F Ballantyne

Institute for Transport Studies (ITS)
34-40 University Road
University of Leeds
LEEDS
LS2 9JT

Email: tseefb@leeds.ac.uk

THANK YOU FOR YOUR TIME, I LOOK FORWARD TO SPEAKING WITH YOU
SOON

Appendix IV – Interview Consent Form



CONSENT FORM

The benefit of integrating freight logistics into urban transport demand management measures and policies

If you are prepared to participate in this study, please read the following statements and indicate your agreement by ticking the box to the right of each one.

- 1) I confirm that I have read and understood the information sheet explaining the above research project and I have had the opportunity to ask questions about the project.
- 2) I understand that my participation is voluntary and that I am free to withdraw at any time without giving any reason and without there being any negative consequences. In addition, should I not wish to answer any particular question or questions, I am free to decline.
- 3) I understand that my personal details will be kept strictly confidential. I understand that my name will not be linked with the research materials, and I will not be personally identified or identifiable in the report or reports that result from the research.
- 4) I agree for the data collected from me to be used in future research.
- 5) I agree to the interview being recorded for transcription purposes only.
- 6) I agree to take part in the above research project and will inform the principal investigator should my contact details change.

Please sign and date below to confirm your consent to taking part in this study.

Name of participant:

Date:

Signature:

Appendix V – Interview Guides – Industry and Local Authority

INTERVIEW GUIDE – INDUSTRY

Theme/Topic	Questions
<i>Perceptions of urban freight</i>	How important in the urban economy do you think freight is regarded?
<i>Perceptions of urban freight</i>	To what extent do you think freight is important to local politicians?
<i>Perceptions of urban freight</i>	What are the main problems with urban freight?
<i>Affect of and response to current policy</i>	What strategies do you adopt to cope with travel problems in urban areas?
<i>Affect of and response to current policy</i>	What tools have local authorities produced that have been helpful to you? (<i>signage, maps, route guidance</i>)
<i>Affect of and response to current policy</i>	What types of transport policies most negatively impact on your business?
<i>Affect of and response to current policy</i>	What types of transport policies most positively impact on your business?
<i>Affect of and response to current policy</i>	What do you see as the major challenges for the next 10 years?
<i>Affect of and response to current policy (and challenges)</i>	What are the greatest impediments to logistics operations in urban areas? (<i>policy restrictions/loading facilities/journey time unreliability/street furniture</i>)
<i>Affect of and response to current policy</i>	Of the cities that you deliver to, are there any that require special planning?
<i>Relationship with policy makers</i>	Do you think that local authorities nationwide adopt a consistent approach to freight issues?
<i>Relationship with policy makers</i>	Do you feel that local authorities listen to industry's needs?
<i>Relationship with policy makers</i>	Currently, how much involvement do you have with policymakers and planners at local authority level? And why?
<i>Relationship with policy makers</i>	Would you like to have more interaction with local authorities in the future? If not, why not? (<i>If yes ask Q15</i>)
<i>Relationship with policy makers</i>	In what ways could the freight industry become more engaged in policy decision making processes?
<i>Relationship with policy makers</i>	How effective do you think organisations such as the RHA and FTA are at influencing transport policy on your behalf in favour of industry?
<i>Challenges for urban freight</i>	What could local authorities do to make freight operations more effective in the future? Have you any examples?
<i>Affect of and response to current policy (and future)</i>	Newcastle introduced a shared bus and lorry lane, have you had any experience of this scheme or something similar? Do you think it would be a good idea to introduce this to other urban areas nationwide?
<i>Future scenarios</i>	If cities nationwide adopted a congestion charging scheme similar to London's, how great would the impact be on your operations?

<i>Future scenarios</i>	Some urban areas are planning to establish urban consolidation centres for high street retail distribution, what is your opinion on these?
<i>Future scenarios</i>	What do you think will be the biggest challenge for urban freight transport in the future? What things are likely to have the biggest impact on future urban freight movements?
<i>Future scenarios</i>	What changes to urban freight movements would you like to see in the future?

INTERVIEW GUIDE - LOCAL AUTHORITIES

Theme/Topic	Questions	Probes
<i>General Goals</i>	What are the key transport targets for your city?	Environmental/emissions? Or Congestion? Or Car Free? Etc.
	What are the main policy objectives for your city?	
<i>Local Authority Choice of Policy</i>	What process was used for selecting the policies set out in LTP3?	Based on evidence or ideology? Use of decision making tools?
<i>Policy Timeframes</i>	What is the time gap between policy approval and its implementation?	
<i>Policy Selection</i>	How do you evaluate the suitability of potential policies for inclusion in LTP3?	To what extent are Origin-Destination matrices used to aid policy decision making? What data sources are used? (roadside interviews, car park surveys, partial trips from number plate recognition cameras, traffic counts...) How far geographically do they extend? What variety of freight operates in your area?
	Who does the authority engage with during the policy planning phase?	Engagement with industry/ industry bodies (RHA, FTA etc.)
	Which stakeholders have a say in the selection of policies?	How are these stakeholders chosen?
<i>Barriers to policy selection</i>	During the creation of LTP3, what have been the main constraints in policy selection?	
<i>Consideration of freight</i>	How important is the consideration of freight in future plans?	What sort of things have you got planned?

<i>Freight industry response</i>	How have your urban transport policies over the last 10 years affected freight?	Policy interventions such as: 'urban freight routes or mapping'; promotion of night time deliveries; parking restrictions; bus lanes; pedestrian zones etc.
	Describe a policy that has had a major positive impact on freight?	Why? In what way? How did this policy arise? Policy interventions such as: 'urban freight routes or mapping'; promotion of night time deliveries; parking restrictions; bus lanes; pedestrian zones etc.
	Describe a policy that has had a negative impact on freight?	
<i>Perceptions of Urban Freight</i>	How important do you think freight is in the urban economy?	
<i>Political Influence</i>	To what extent is freight important to local politicians?	
	Given that many freight trips cross regional boundaries, how important is regional coordination of transport policy?	
	What level of engagement currently exists between planners and policy makers and industry?	What forums/committees meet? Who is involved? What type of decisions result from discussions at these meetings?
<i>Urban Logistics</i>	What are the greatest impediments to logistics operations in <i>your urban area</i> of influence? (<i>name city etc</i>)	Strict policies restricting movements? Street furniture/physical impediments?
<i>Future Trends (concluding questions)</i>	How different do you think urban freight movements could be in the future?	
	What do you think will be the biggest challenge facing urban freight transport operations in the future?	

Appendix VI – Workshop Advertisement

FREE WORKSHOP for:

Local Authorities & Freight Operators

Calling **Local Authority Transport Planners** and **Logistics & Transport Managers**







Tuesday 7th February 2012

8:30-12:30 Holiday Inn Rotherham

Tuesday 14th February 2012

8:30-12:30 Holiday Inn Basingstoke

** Free to attend although you must pre-register as places are limited **

-  Opportunity to network with fellow transport professionals
-  Chance to openly discuss current logistics issues & debate potential improvements
-  Bacon roll on arrival
-  Refreshments served throughout the event
-  Free parking at venue
-  Discounted B&B rate at venue



Workshop objectives:

- 1) To create awareness of the implications that urban transport policy has on essential freight movements and operations.
- 2) To identify a range of possible solutions for servicing urban areas more efficiently, whilst alleviating problems caused by urban traffic congestion (reduce air & noise pollution caused by stationary vehicles, create safer urban environments, improve existing policies that may no longer apply).
- 3) To understand how engagement between policy makers, freight operators and others can contribute to the creation of better informed, more efficient urban transport policies in the future.

To book a place on either workshop, please contact by phone or email:

Miss Erica E F Ballantyne

PhD Research Student

✉ tseefb@leeds.ac.uk

☎ 0113 343 7325

Dr Greg R Marsden

Director – Institute for Transport Studies

✉ G.R.Marsden@its.leeds.ac.uk

☎ 0113 343 5358

Institute for Transport Studies, University of Leeds

34-40 University Road, Leeds, LS2 9JT

Appendix VII – Workshop Information Sheet



UNIVERSITY OF LEEDS **INFORMATION SHEET**

The benefit of integrating freight logistics into urban transport demand management measures and policies

You are kindly invited to take part in a workshop for the above named research project. Please take some time to read through the following information carefully, before deciding to take part. It is important for you to understand the purpose of the research and what it will involve. If you require any further information, please do not hesitate to contact me.

The Project

The research involves understanding the current pattern of urban transport policies and transport demand management (TDM) measures, and it will be examining how these match the objectives of policy makers. In addition it will examine the suitability and implications future policies may have on urban freight movements. It is hoped that this work will create a deeper awareness of the implications that urban policy decision making has on essential freight movements.

Participant Selection

Participants are being recruited from two distinct sectors, the first are representatives from Local Transport Authorities across the UK, and the second are representatives from within the UK transport industry, namely logistics companies who undertake a large proportion of their operations in urban areas making deliveries or collections.

Involvement in the research

Taking part in the research is entirely voluntary and you may choose to discontinue or withdraw from the research at any time without providing a reason.

The workshop will last around 3 ½ hours, over a morning. It will involve discussions and group idea generation into the ways that urban transport policy could be amended to improve logistics operations in urban areas that will ease current urban traffic problems (including issues such as traffic congestion, reducing air and noise pollution, and creating a safer urban environment).

Data protection & Confidentiality

All personal information gathered during the course of the research project will be kept strictly confidential, and you will not be identified personally in any reports or publications that result from this work.

Work generated during the course of the workshop will be used for analysis purposes only, no other use will be made of them without your permission and no one outside the project will have access to the original data.

Dissemination of Results

The results of this research will be written up in my doctoral thesis, and hopefully published in academic journal articles. As stated above, you will not be identified personally in the published work.

Further Information

If you require any further information, please contact either myself or my supervisor.

Miss Erica E F Ballantyne

Institute for Transport Studies
(ITS)
34-40 University Road
University of Leeds
LEEDS
LS2 9JT

Dr Greg Marsden

Senior Lecturer – Transport Policy and
Strategy
Institute for Transport Studies (ITS)
University of Leeds
LEEDS
LS2 9JT

You will be provided a copy of this information sheet and a signed consent form to keep.

Thank you for taking the time to participate in this research project.

Appendix VIII – Workshop Consent Form



CONSENT FORM

The benefit of integrating freight logistics into urban transport demand management measures and policies

If you are prepared to participate in this study, please read the following statements and indicate your agreement by ticking the box to the right of each one.

- 1) I confirm that I have read and understood the information sheet explaining the above research project and I have had the opportunity to ask questions about the project.
- 2) I understand that my participation is voluntary and that I am free to withdraw at any time without giving any reason and without there being any negative consequences. In addition, should I not wish to answer any particular question or questions, I am free to decline.
- 3) I understand that my personal details will be kept strictly confidential. I understand that my name will not be linked with the research materials, and I will not be personally identified or identifiable in the report or reports that result from the research.
- 4) I agree for the data collected from me to be used in future research.
- 5) I agree to take part in the above research project and will inform the principal investigator should my contact details change.

Please sign and date below to confirm your consent to taking part in this study.

Name of participant:

Date:

Signature:

Appendix IX – Workshop Agenda

INTEGRATING LOGISTICS & URBAN TRANSPORT POLICY

Tuesday 14th February 2012

WORKSHOP PROGRAMME

Time	Activity
08:30	Registration & Bacon sandwiches on arrival
08:45	Welcome and brief introduction
09:00	Session 1 – Idea Generation (Split into red and blue groups)
09:45	Session 2 – Plenary I
10:30	Break – Tea & coffee
10:45	Session 3 – Preferences (Split into 2 mixed groups)
11:15	Session 4 – Plenary II
12:30	Closing remarks & opportunity for feedback

SESSION 1 – IDEA GENERATION

(*Red Group* – Local Authorities, *Blue Group* - Freight industry representatives)

Part A (8-10mins) Silent generation of ideas in writing

On the paper provided, write your responses in brief sentences/phrases to the following question:

‘In what ways could Urban Transport Policy be amended to improve operations in urban areas that will ease current urban traffic problems?’

Part B (15-20mins) Round-robin recording of ideas

Take it in turns to read out ideas to the group, until all ideas have been presented and recorded on the flip chart paper.

Part C (10-15mins) Discussion of listed ideas

Briefly discuss the ideas listed on the flip chart including: their intended meaning, comment on the potential impacts and possible side effects of the ideas being implemented. Spend no more than 2mins on each idea!

SESSION 2 – PLENARY I**Part A (20mins) Exchange & Present Ideas**

Groups take it in turns to share their ideas with each other, and note duplications.

Part B (15-25mins) Individual voting

On the voting sheet provided, participants rate the ideas from the combined group's list – rating each idea based on effectiveness and acceptability.

TEA/COFFEE BREAK**(15mins)****SESSION 3 – PREFERENCES**

(Red and Blue Groups divide and form two new mixed groups)

(25-30mins) Discussion & Statement Formulation

- In mixed groups, discuss the results of the ranked options.
- Work through in rank order, formulating statements for each highlighting the potential benefits of the proposal to both local authorities and policy makers.

SESSION 4 – PLENARY II**(30-45mins) Present benefits statements**

Alternating between groups, present the benefits of each idea to the whole group.

Session concludes with a brief discussion of any final thoughts.

EVALUATION FORMS**WORKSHOP CLOSE**

Appendix X – Workshop options voting sheet

GROUP:

For each of the options discussed, please rate on the scales below:

a) How effective do you think the action/policy would be?

b) How acceptable do you find the option to be?

Option	Effectiveness <i>(Shade max 3 per row)</i>	Acceptability <i>(Circle Yes/Maybe/No)</i>			Rank Favourite
		Y	M	N	
Example	○○○	Y	M	N	
A	○○○	Y	M	N	
B	○○○	Y	M	N	
C	○○○	Y	M	N	
D	○○○	Y	M	N	
E	○○○	Y	M	N	
F	○○○	Y	M	N	
G	○○○	Y	M	N	
H	○○○	Y	M	N	
I	○○○	Y	M	N	
J	○○○	Y	M	N	
K	○○○	Y	M	N	

Appendix XI – Workshop Evaluation Form



INTEGRATING LOGISTICS & URBAN TRANSPORT POLICY

Tuesday 14th February 2012

Workshop Evaluation Form

Thank you for attending the Integrating Logistics & Urban Transport Policy workshop. We hope that you found it interesting and that we met your expectations. We would be very grateful if you could take a moment to complete the workshop evaluation form and return to a facilitator at the end of the workshop. Your comments will assist us in improving future workshops that we will organize.

Your name (optional): Email Address (optional):

Workshop Content and Organisation						
<p>8.7.1 Scale: 1- strongly disagree; 2 – disagree; 3 – neutral; 4 –agree; 5 – strongly agree</p> <p>Please provide feedback in the comments box</p>						
	1	2	3	4	5	Comments
The workshop met its stated aims and objectives.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
The workshop was scheduled at a suitable time.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
The workshop location was appropriate and satisfactory.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
The catering arrangements were appropriate and satisfactory.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
The workshop was paced appropriately.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
The pre-workshop administration was efficient and informative.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

Your Feedback	
	Comments
Which elements of the workshop did you like best? Why?	

Which elements of the workshop did you least enjoy? Why?		
How could this workshop be improved and which aspects would you change in future? Why?		
Would you recommend this or a similar workshop to a colleague?	Yes <input type="checkbox"/>	No <input type="checkbox"/>
Have you any other comments about the workshop...		

Thank you for participating, we appreciate your feedback.

Where did you hear about this workshop? (Please tick all that apply)	
<input type="checkbox"/>	Personal email invitation
<input type="checkbox"/>	From a colleague
<input type="checkbox"/>	CILT events
<input type="checkbox"/>	ECO Stars
<input type="checkbox"/>	Freight Operator Recognition Scheme (FORS)
<input type="checkbox"/>	ITS (UK)
<input type="checkbox"/>	University of Leeds – profile web page
<input type="checkbox"/>	Other (please specify)

Appendix XII – Risk Assessment Form



INSTITUTE FOR TRANSPORT STUDIES
Risk Assessment
Students Travelling on University Business



This form should be used by students when travelling for low risk off-campus visits such as meetings, seminars, conferences.

For higher degree students this assessment must be completed by the individual and checked by the student supervisor.

Refer all visits outside the UK and any involving high risk activities and/or carriage of dangerous goods to ITS Health & Safety Co-ordinator.

Details of how to complete this form are given in "Instructions for completing the Risk assessment – Students Travelling on University Business form".

PART A

1 TRAVEL DETAILS	
Name of traveller	Erica E Ballantyne
Contact tel. number	
Contact Email (if appropriate)	
Itinerary	
Location 1 (address/specific area/postal district/street name/etc)	
From	Date: 21/07/11 Time: 15:00
To	Date: 21/07/11 Time: 16:30
Purpose	Research Interview
Accommodation	No <input checked="" type="checkbox"/> Yes <input type="checkbox"/> Please give details (name, address, telephone number, email):
Location 2 (address/specific area/postal district/street name/etc)	
From	Date: Time:
To	Date: Time:
Purpose	



3 TRAVELLER INFORMATION

Names, addresses and telephone numbers of next of kin available to departmental contact	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
Do you have any medical condition (e.g. disability, allergies; asthma; diabetes; epilepsy; back/foot problems; heart/blood pressure problems; etc.) or are you currently taking any prescribed medication that you think may affect your safety during the visit?	No <input type="checkbox"/> Yes <input checked="" type="checkbox"/> Please contact your supervisor.
Call-in system	No <input checked="" type="checkbox"/> Yes <input type="checkbox"/> Please give details in Part B

4 TRANSPORT

Mode(s) of transport	Coach <input type="checkbox"/> Bus <input type="checkbox"/> Rail <input type="checkbox"/> Air <input type="checkbox"/> University vehicle <input type="checkbox"/> Private vehicle <input checked="" type="checkbox"/> Hire vehicle <input type="checkbox"/> Taxi <input type="checkbox"/> Bicycle <input type="checkbox"/> Foot <input checked="" type="checkbox"/>
Road vehicle driving:	
Vehicle well maintained	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>
Vehicle safety checklist completed prior to start of travel	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input checked="" type="checkbox"/>
Driver qualified to drive vehicle	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>
Driver has adequate insurance cover	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>



PART B

1 COMMENTS/NOTES/OTHER INFORMATION

Other than the normal hazards associated with travelling, identify any other relevant hazards and their control measures and record them here. Also, train/bus/flight times, comments, notes, provisos or other information that needs to be recorded can be included in this section.



PART C

1 DECLARATION

To the best of my knowledge, the information contained in this risk assessment form is an accurate record of the foreseeable hazards/dangers and risk control actions that will be taken for the visit to the stated locations. ITS Travellers Generic Risk Summary Guide has been read and control measures will be implemented where appropriate and practicable.

Copy of this risk assessment will be filed with Departmental Contact	Yes <input checked="" type="checkbox"/>
Name of person who completed the form	Erica Ballantyne
Signature:	
Date:	

2 APPROVAL

The information provided in this form complies with the requirements of the University of Leeds for risk assessment and is in accordance with the ITS procedures for carrying out the process at the time of its submission. Approval should normally be given by the student supervisor.

Name of person giving approval	
Signature:	
Date:	

Appendix XIII – Summary of workshop feedback – Section One

Summary of feedback from workshop 1

Section 1 – Evaluation form

Local Authority						Content & Organisation	Industry					
5	4	3	2	1	Mean		5	4	3	2	1	Mean
4	1	0	0	0	4.8	Workshop met its Stated aims & objectives	0	2	0	0	0	4
3	0	0	2	0	3.8	Workshop was scheduled at a suitable time	2	0	0	0	0	5
3	2	0	0	0	4.6	Workshop location was appropriate and satisfactory	1	1	0	0	0	4.5
4	1	0	0	0	4.8	Catering arrangements were appropriate and satisfactory	0	1	1	0	0	3.5
3	2	0	0	0	4.6	Workshop was paced appropriately	0	2	0	0	0	4
4	1	0	0	0	4.8	Pre-workshop administration was efficient and informative	0	1	1	0	0	3.5

Summary of feedback from workshop 2

Section 1 – Evaluation form

Local Authority						Content & Organisation	Industry					
5	4	3	2	1	Mean		5	4	3	2	1	Mean
3	2	0	0	0	4.6	Workshop met its Stated aims & objectives	2	1	0	0	0	2.8
4	1	0	0	0	4.8	Workshop was scheduled at a suitable time	3	0	0	0	0	3
4	1	0	0	0	4.8	Workshop location was appropriate and satisfactory	2	1	0	0	0	2.8
2	2	0	1	0	4	Catering arrangements were appropriate and satisfactory	2	0	1	0	0	2.6
1	4	0	0	0	4.2	Workshop was paced appropriately	0	2	1	0	0	2.2
2	3	0	0	0	4.4	Pre-workshop administration was efficient and informative	1	1	1	0	0	2.4

Summary of feedback from workshop 3

Section 1 – Evaluation form

Local Authority						Content & Organisation	Industry					
5	4	3	2	1	Mean		5	4	3	2	1	Mean
1	2	1	0	0	3.2	Workshop met its Stated aims & objectives	1	2	1	0	0	3.2
1	3	0	0	0	3.4	Workshop was scheduled at a suitable time	2	3	0	0	0	4.4
2	2	0	0	0	3.6	Workshop location was appropriate and satisfactory	2	2	1	0	0	4.2
2	2	0	0	0	3.6	Catering arrangements were appropriate and satisfactory	2	3	0	0	0	4.4
3	1	0	0	0	3.8	Workshop was paced appropriately	2	2	1	0	0	4.2
3	1	0	0	0	3.8	Pre-workshop administration was efficient and informative	2	3	0	0	0	4.4