Introduction – city distribution: challenges for cities and researchers
Cathy Macharis and Sandra Melo

BACKGROUND AND RATIONALE OF THE STUDY

Urban goods distribution (UGD) plays an important role in the sustainable development of cities. It helps to support urban lifestyles, to serve and retain industrial and trading activities, and contributes to the competitiveness of industry in the region concerned (Anderson et al., 2005). Despite the relevant role of this activity, goods distribution also conflicts with other urban functions and thus generates negative (economic, environmental and social) impacts on the economic power, accessibility, quality of life and attractiveness of urban areas. The most common examples of such impacts at the three dimensions of sustainability are: air pollution (environmental sustainability); fatalities, noise disturbance, local traffic safety (social sustainability); and journey unreliability and delivery delays (economic sustainability). Furthermore, goods traffic reduces the accessibility of passenger transport in urban areas, and the efficiency of the UGD process itself can be affected by congestion, in this way also affecting mobility in the area. To give some quantitative examples, freight traffic operated by heavy goods vehicles (HGVs) contributes to approximately 30 per cent of transport-related energy consumption, which accounts for about 20 per cent of all energy consumption in advanced economies (OECD, 2003) and goods movements in urban areas represent between 20 and 30 per cent of vehicle-kilometres (Dablanc, 2007), so there is no doubt that dealing with logistics and freight distribution is imperative.

Despite the critical significance of logistics and freight distribution, neither urban studies nor transport research has paid any particular attention to this subject until recently. Spatial studies still lack a full understanding of logistics organization and freight distribution, which particularly applies to the role that cities and urban development play in this respect (Hesse and Rodrigue, 2004). In turn, the relationships between logistics and spatial or urban development are usually neglected by industry stakeholders.
In such a context, and even though they were aware of the negative side of UGD, to some extent cities tried to live with those problems. Each city has tried to find and implement its own solution, resulting in initiatives that were usually less than optimal from a societal, environmental or economic point of view. However, society is now becoming more demanding than it was in the past, and cities are facing a difficult challenge that must be met without further delay. Cities need to maintain and promote their sustainability, mobility and quality of life, while ensuring that UGD systems efficiently serve their needs. To meet this challenge, cities mainly have to face the difficult task of promoting UGD systems that are environmentally friendly and at the same time efficient enough to satisfy both society and distribution companies. Second, cities need to overcome the lack of awareness and knowledge about UGD among governments and city planners that results in policy-making mainly from the passenger transport perspective, without adequate consideration of the actors involved in goods movement and its complex characteristics (Melo, 2010).

Various measures and initiatives have been aimed at improving goods distribution performance and reducing the environmental and socio-economic negative effects of urban freight transport. These include zero-emission zones, restrictions on vehicle dimensions and design, time windows for deliveries, consolidation strategies, use of city distribution centres, use of electric cars, use of freight trams, mobility management and night distribution. Results and experiences have, however, shown that unintended side-effects might occur when implementing many of these actions. As an example, investments in urban freight consolidation centres have certainly been a failure in many cities (Zunder and Ibanez, 2004; Marcucci and Danielis, 2008). This is partly due to the fact that not all stakeholders were taken into account when pre-assessing the actions and due to difficulties in cooperating with such different perspectives. Moreover, there is a lack of evaluation and systematic assessment of the effects of different measures, which may lead to the promotion and implementation of solutions unsuitable to the local context. In urban distribution several actors are involved: the receivers of the goods; the transport companies; sometimes a city distribution centre manager; the citizens and the government. Failing to take the aims of these different stakeholders into account leads to problems in the implementation phase. A measure might seem a good action from the city council perspective, but if the receivers or the logistic service providers do not support it (or if the measure does not reflect their interests), it will be very difficult to implement it. It is therefore necessary to design new measures that overcome the shortcomings of previously developed measures and to take the aims of the stakeholders explicitly into account.
Research into freight transport and distribution presented throughout this book provides information about the changes and consequences imposed by the integration of stakeholder perceptions of policy measures and allows us to identify issues that should be studied further: (a) it presents initiatives that in specific contexts were considered ‘best practices’ in terms of their contribution to an increasing sustainability and quality of life; (b) it analyses the impacts on society and on several types of stakeholders along the logistics chain by adopting methodologies that reflect their interests; and (c) it gives recommendations on the inclusion of stakeholder perspectives and expectations on the simulated scenarios, providing a transparent and objective support for decision-making.

STRUCTURE AND OUTLINE OF THE BOOK

The starting point of the book is an overview of the main fields of research and the related questions that have been investigated. The book brings together knowledge of the problem situation and its different possible solutions (Part I), looks at possible methodologies to tackle its multidimensional aspects (Part II) and examines several cases in different European cities (Part III).

The first part starts with a chapter by Laetitia Dablanc that discusses recent advances in urban freight research, as well as the diversity of urban freight activities in different world regions. As a result, it identifies urban freight transport issues that are shared by cities in both the developed and developing world and provides recommendations for cities seeking to promote a more efficient and environmentally friendly freight system. The underlying principle of those recommendations is that freight transport must serve the local economy and the environment. The author argues convincingly that although it is not easy to create an urban freight system that benefits the urban economy and the environment, there are possibilities for progress at low cost and with great benefits.

H.J. Quak enumerates no less than 106 measures that can be used in urban freight transport. He distinguishes three main solution directions to be considered and geared to one another in order to improve sustainability of city distribution: logistical solutions; policy solutions; and technological solutions. His chapter discusses the evaluation of these initiatives structured as 12 different types: road pricing; licensing and regulation; parking and unloading; carrier cooperation; vehicle routing improvement; technological vehicle innovation; consolidation centres; underground logistics systems; road infrastructure development; standardization of load units; transport action; and intermodal transport. The author emphasizes
the existence of a limited interaction between the different actors, local authorities and carriers that prevents the stakeholders from obtaining insights into each other’s problems and thus getting a complete picture of the different urban freight transport issues. To develop more sustainable urban freight transport, the author suggests increased interaction between different stakeholders and their actions.

Roel Gevaers, Eddy Van de Voorde and Thierry Vanelislander tackle the problem of the last mile – the direct-to-consumer deliveries mostly created by e-commerce activities. Two main problems create a cost-ineffective operation: the not-at-home problem and a lack of critical mass. A last-mile typology is put forward based on the value of the goods shipped. Several factors play a role in the cost-effectiveness of last-mile delivery: consumer service level (the larger the time window, the better the routes can be optimized); security and delivery type (whether a signature is necessary or not); the geographical region and market penetration or density (the more dense, the more efficiently routes can be combined); the vehicle fleet and technology (e.g. use of electric vehicles); and the environment. This last factor is mostly in contradiction with the others as consumers are not willing to pay more or wait longer for their delivery, especially not in the case of a low-value product.

In terms of methodology, the challenge for researchers lies in finding ways to assess the manifold effects and incorporating the points of view of the different stakeholders. To overcome that challenge, three different approaches are presented in Part II of the book.

Amanda Stathopoulos and her co-authors examine the problem structure as identified by three main stakeholder types (freight carriers, local policy-makers and retailers) in the discussion surrounding the hypothetical introduction of new policy measures to improve the current scheme of managing freight distribution in Rome’s Limited Traffic Zone (LTZ). The identification of the points of consensus and discord from the perspective of three main types of stakeholder is achieved through a number of in-depth stated-preference interviews in the Roman city logistics sector. The main point of this chapter is that, to be able to define a comprehensive framework for planning and developing efficient freight distribution systems in urban areas, a broad spectrum of actors needs to be involved, ranging from government policy-makers, transport operators, freight forwarders, retailers and residents.

Cathy Macharis and her co-authors propose a multi-actor multi-criteria analysis (MAMCA) to incorporate the points of view of the different stakeholders. The MAMCA makes it possible to compare different options (in this case different options for night distribution) in light of what the stakeholders find important. For city distribution, these actors
are the receivers, the transport sector, society as a whole and the employees. The evaluation of the different options for night distribution shows to what extent the aims and objectives are attained for each of these stakeholders. This information is crucial in defining possible implementation paths for innovative city distribution concepts.

Sandra Melo and Álvaro Costa suggest the use of quantitative tools such as the definition of a set of indicators to predict stakeholders’ opinions and concerns about (operational) mobility and sustainability. The main idea (as also argued by Hans Quak in Chapter 2) is that the more each partner knows about the other’s expectations, the easier it will be to achieve win–win solutions. The defined set aims not only to be an instrument of comparative evaluation and evolution, but also an accessory tool to be used by assessment tools such as simulation, surveys or empirical-data collections. With the support of a case study carried out in Porto (Portugal) and a survey to scrutinize the suggested set, the chapter presents a methodology that may serve as a framework for the assessment of the performance of goods distribution initiatives, as well as for the analysis and comparison of policy scenarios/strategies to mitigate negative impacts that originate from goods transport and distribution activities.

A GUIDED TOUR THROUGH THE CASES

As stated above, several actors are involved in city distribution and a good understanding of what the drivers are for these stakeholders determines what innovative concepts are implemented. The cases presented in the book, coming from different geographical origins and looking at different concepts, were selected to show different angles from which city distribution can be seen. They all differ in terms of type of transportation mode, geographical location and, most important, from which stakeholder point of view they are presented.

The chapter by Carlo Vaghi and Marco Percoco highlights the point of view of the policy-makers and its interaction with other actors in the definition of the ‘city logistics system’. The authors present a comparative analysis of the main city logistics systems in Italian cities and an in-depth cost–benefit analysis of the case of Padua (CityPorto Padova). The case study of Padua consists of a city logistics system based on a formal agreement between public and private stakeholders on regulations and reciprocal supply of specific assets. The analysis, made through a cost–benefit analysis approach, assesses the environmental and social effectiveness of this business model, measured in terms of social benefits versus costs. The
outcome is very promising concerning the environmental effectiveness of
the implementation of such city logistics scheme in medium-sized cities.

The chapter by Tom van Lier and Cathy Macharis takes the point of
view of an inland port. Inland ports, in this case the port of Brussels,
can play an important role in sustainable city distribution. The logistic
functions of city ports are however under pressure in several countries as
residential lofts with a view on the canal are bringing in more money for
real-estate developers and the building sector. The authors show how to
measure the avoided external costs of avoided truck transport thanks to
the use of the inland waterways. This allows incorporating sustainability
indicators in policy measures and investment decisions in the port, and can
help to counteract the actual pressure on inland ports.

The chapter by Julius Menge and Paul Hebbes focuses on the CEP
(courier, express and parcel) services. Their case is situated in Berlin and
gives the point of view of drivers. The case study examines a research and
implementation project ‘SmartTruck’ implemented by DHL Express’s
depot in Berlin. SmartTruck is a combination of real-time route plan-
ning (which allows operators to insert last-minute requests and informa-
tion on accidents and construction sites) and consignments monitored by
RFID (radio-frequency identification). In CEP services, several actors are
involved, namely the drivers (often freelancers), the planners and the cus-
tomers. Often it is difficult to take into account ecological aims in the opti-
mization of CEP services as customers expect high-quality standards from a
higher-priced express service. What is also important is to see if ICT devices
are accepted by the drivers. To test this, no quantitative or even qualitative
survey method is really suited, and so a participating surveillance method
was used. All in all, the SmartTruck device helped to identify more compact
routes, characterized by significantly fewer kilometres per tour while even
increasing the use of the vehicle’s capacity. This leads logically to a decrease
in fuel consumption and therefore also in greenhouse-gas emissions.

Jochen Maes and Thierry Vanelslander look at the possibility of rail for
urban transport. Rail transport is known for its potential for longer dis-
tances and its usefulness in the intermodal chain. For urban transport, the
case of Monoprix, a large retailer in France, shows very clearly the possi-
bilities for rail transport on shorter distances. In order to avoid congestion
in the Paris area, Monoprix ships large volumes of freight from a so-called
smart logistics centre to a downtown logistics centre, a distance of only
30 km. From there on, goods are distributed by natural-gas-powered
vehicles. In Paris, as in other cities, different actors are involved with quite
different perspectives, namely the citizens, the transport company and
the shipper. In order to come to a common understanding, a charter was
signed by the different partners, leading to more sustainable deliveries.
Sandra Melo finally brings together the different points of view. Her chapter evaluates ‘good practices’ in city distribution through the use of a quantitative methodology considering both public and private stakeholders’ perspectives and the local intrinsic characteristics of implementation. The quantification is carried out through a systemic model specifically developed for the city of Porto (Portugal) and using the microscopic traffic simulator AIMSUN. This software calculates each of the output indicators adopted to measure mobility and sustainability under public and private objectives of three scenarios; cooperative systems; collaborative systems; and enforcement. The author argues that if the effects of an initiative can be estimated, stakeholders will be conscious of the benefits available from a specific measure, which can easily lead to an integrated strategy. The challenge is to find that common level of acceptance by all stakeholders involved in the negotiation. That level will not be the best level each group would individually aspire to, but it is the one that maximizes the consideration of all the interests involved.

**RESEARCH AGENDA**

City distribution has a minor role in transport planning procedures in most cities, although freight transport operations represent a substantial proportion of negative effects on the functionality of spatial activities. The case studies described throughout the book show that knowledge and awareness in the area of urban freight transport is low, which also contributes to a low level of interest in the subject and makes it hard to predict outcomes of certain actions. This is in line with the conclusions of the European project BUSTRIP, which found that for Swedish cities only 1 per cent had a full-time employee working on freight transport issues, and that people working on transport planning showed very little interest in city distribution (Lindholm, 2010). The implication for local authorities is that the issue of urban freight transport should have higher priority on the agenda. Knowledge in this area should be improved. We hope that this book helps to improve awareness and raises interesting possibilities in this area.

For the analysis of UGD, results are highly dependent on the framework conditions and, thus, selected initiatives are described looking at a specific transport chain, and considering spatial constraints and commercial activities located in the respective area. This disables the transferability of results usually associated with the term ‘best practices’. This does not mean that existing practices, which have been designed for one particular context, cannot serve as sources of inspiration in the design of another
context’s response to its own challenges. Nevertheless, depending on the city, not all the tools may be equally suitable, nor may they be uniformly applicable.

There is probably no perfect solution for sustainable city distribution. Even a perfect combination of measures is difficult to find. What we are trying to show with this book is that measures should be evaluated according to the typical situation of the city, but, even more important, that the different stakeholders should be taken into account. Indeed, recognizing and understanding the concerns of different stakeholders and their recognition of the problem with respect to urban freight is a key factor in successfully introducing urban freight policies. The main challenge for researchers lies in developing methodologies that facilitate communication and cooperation between the different actors. This can be done, for example, by defining a common evaluation framework with quantitative indicators or an evaluation framework where the points of view are explicitly modelled.

Altogether, the chapters presented here underline the need for the development of an integrated agent-based approach to the evaluation of the performance of initiatives on UGD. The book describes some work that has already been done in that direction. More information on the aims of the different actors should be collected in order to assess them accordingly.

ACKNOWLEDGEMENTS

The editors would like to thank the NECTAR organization for the support they gave for the cluster meeting in Porto. This brought together these contributions. We would also like to thank all the authors. Special thanks also to Annalia Bernardini for her help in organizing the contributions. During the editing of this book, Sandra made another delivery, which is why we dedicate this book to Matilde.

REFERENCES


Introduction
