



# A stakeholder-based multicriteria evaluation framework for city distribution



Cathy Macharis, Lauriane Milan<sup>\*</sup>, Sara Verlinde

Vrije Universiteit Brussel-MOBI, Pleinlaan 2, Brussels, Belgium

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## ABSTRACT

Urban areas face particular challenges for freight transport, both in terms of logistical performance and environmental impact. Many innovative city distribution concepts have failed because not all stakeholders were taken into account in the decision-making process (Macharis & Melo, 2011). There is a clear need for a comprehensive approach to evaluate urban freight solutions in order to assess their chance of success. A new evaluation framework was worked out within the STRAIGHTSOL project (strategies and measures for smarter urban freight solutions, EC FP7) and incorporates the city distribution actors and their objectives as the primary focus. The multi-actor multi-criteria analysis (MAMCA) methodology developed by Macharis (2005), (2007) ties with this aim and is complemented with other methods such as the cost-benefit analysis and business modeling. The so-called city distribution – multi-actor multi-criteria analysis (CD-MAMCA) methodology is fully explained through a case study with Kuehne and Nagel which tested real-time remote monitoring of the cargo leading to improve rail tracking and warehouse management in Thessaloniki.

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## 1. Introduction

Urban goods distribution plays an important role in the sustainable development of cities. It helps support urban lifestyles, serves and retains industrial and trading activities and contributes to the competitiveness of industry in the region concerned (Anderson, Allen, & Browne, 2005). Logistics is required to replenish food stocks and other retail goods in shops, to deliver supplies to offices and remove household waste from urban areas (DGMOVE, 2012). Urban freight transport however also generates many problems, such as congestion, pollution, and traffic safety. In order to tackle these particular challenges in a city distribution context, technological and logistical measures including innovative concepts have been tested and new developments are on their way. Within STRAIGHTSOL (Strategies and measures for smarter urban freight solutions, EC FP7) the following measures are demonstrated:

- Night-time distribution in Brussels (Colruyt & Delhaize)
- New regulations on loading/unloading operations in Lisbon (EMEL)
- Rail tracking and warehouse management in Thessaloniki (K + N)
- Standardized information in last mile distribution in Oslo (GS1)
- Urban consolidation center in Barcelona (DHL)
- A mobile depot for city deliveries in Brussels (TNT Express)
- New remote “bring-site” monitoring systems in United Kingdom (Oxfam).

More information about the demonstrations is available on the STRAIGHTSOL website.<sup>1</sup> Many cities have tried to find and implement their own solutions, aiming to support both their growing activities and their quality of life. However, although many initiatives seemed successful in pilots and demonstrations, unexpected side-effects may occur with the large scale or long term adoptions, as illustrated in the unsuccessful implementation of urban freight consolidation centers in many cities (Browne, Allen, Sweet, & Woodburn, 2005, Marcucci & Danielis, 2008). These pilots and test cases show that many of these freight platforms are granted only a short lifespan because not all the stakeholders, with their own and often conflicting objectives, are involved early on the decision process. Additionally, there is a lack of systematic assessment of the effects of different measures, which is why there is a clear need for a comprehensive approach to evaluate urban freight measures within the urban and inter-urban contexts and across regions in the European Union. Consequently, a new assessment framework has been developed for the evaluation of measures applied to urban–interurban transport interfaces within the STRAIGHTSOL project. To ensure the success of the adopted measures, this new framework includes multiple methodologies. Among them, a multi-actor multi-criteria analysis (MAMCA) (Macharis, 2007) stresses the involvement of various stakeholders in the decision process as well as on the impact of measures taken both on society and in the private sector. This paper is a summary of work conducted as part of the STRAIGHTSOL project and describes the stakeholder-based approach of this overall framework with the elaboration of a city distribution dedicated multi-

<sup>\*</sup> Corresponding author. Tel.: +32 (0)2 629 24 62; fax: +32 (0)2 629 21 86.  
E-mail addresses: [Cathy.Macharis@vub.ac.be](mailto:Cathy.Macharis@vub.ac.be) (C. Macharis), [Lauriane.Milan@vub.ac.be](mailto:Lauriane.Milan@vub.ac.be) (L. Milan), [Sara.Verlinde@vub.ac.be](mailto:Sara.Verlinde@vub.ac.be) (S. Verlinde).

<sup>1</sup> [www.strightsol.eu](http://www.strightsol.eu).

actor multi-criteria analysis (CD-MAMCA). First, because of the important role they play, the stakeholders within a distribution context are discussed using a literature study and are validated with the project partners. The key criteria for each stakeholder are clearly identified. Secondly, the city distribution dedicated multi-actor multi-criteria analysis (CD-MAMCA) framework is presented with its complementary methodologies, i.e. social cost–benefit analysis and business modeling. A more step-by-step approach is explained through the STRAIGHTSOL framework description. The stakeholder-based approach is illustrated by a case study with Kuehne and Nagel which tested real-time remote monitoring of the cargo using GPS installed on the train wagons leading to improve rail tracking and warehouse management in Thessaloniki.

## 2. Stakeholders and objectives

Among the local specificities, the different stakeholders' unique perspectives are central in logistics. Indeed, urban freight policies may succeed only if they are supported by the freight carriers and their organizations, the local business groups and the local residents (Dablanc, 2011). The following section considers the different definitions of stakeholders as a starting point and generates through an iterative process the groups of all relevant stakeholders together with their important objectives and how they are achieved.

### 2.1. Stakeholders within the city distribution context

Many authors stress that stakeholder involvement is an essential requirement for the successful outcome of any project. Indeed, each actor has a very specific role and specific responsibilities through a decision process. Freeman (1984) defines a stakeholder as an individual or a group of individuals who can influence the objectives of an organization or can be influenced themselves by these objectives. This definition is very organizational and business-oriented. Another definition is suggested by Banville, Landry, Martel, and Boulaire (1998) where a stakeholder is someone interested in a problem in any one of the following three ways: a) by mainly affecting it, b) by mainly being affected by it and c) by both affecting it and being affected by it. In the definition by Macharis, Mareschal, Waaub, and Milan (2014), stakeholders are any group of people, organized or not, who share a common interest or stake in a particular issue or system. A stakeholder should be rather defined based on his/her stake in the issue, as this determines whether he/she can affect or will be affected by the ultimate outcome.

Regardless of the definition used, urban freight transport initiatives and policies clearly involve multiple stakeholders who need to be explicitly considered in the decision making process and range from professional stakeholders such as carriers and suppliers to citizens living and working in this urban environment (Ballantyne, Lindholm, & Whiteing, 2013). The identification of the relevant stakeholders for urban freight transport is based both on a literature study and on the input of the project's seven demonstrations. Within the literature on urban freight transport we encounter more or less the same categories over and over. For Witlox (2006), there are three groups of stakeholders: trade and industry, society, and public policy makers. Trade and industry include suppliers, carriers, receivers, wholesalers and distribution companies. Society consists of inhabitants, employees, commuters, consumers and tourists. Public policy makers are local, regional and national governments. Taylor (2005) identified four key stakeholders for the specific purpose of freight transport: shippers, residents, freight carriers, planners and regulators. Each stakeholder has his/her own objectives and his/her own role. Quak (2008) identified four key stakeholders for urban freight transport in the railway sector: local authorities, carriers, shippers and receivers, and residents. More recently, the framework of Behrends (2011) focused on the purpose of sustainable development and divided stakeholders into three groups: shippers and receivers, authorities, and transport operators.

### 2.2. STRAIGHTSOL validation

In order to complement this theoretical knowledge with practical input, the participating scientific partners within STRAIGHTSOL were asked to collect specific information about the demonstration for which they are responsible. They were told to describe the context of the demonstration, the previous way of working, the possible alternatives for this way of working, which of these alternatives was going to be tested in the demonstration and what the expected outcomes were. The respondents were also asked to make a list of the various people, groups of people or companies affected by the demonstration. For each stakeholder group, they were also asked to list their objectives based on conversations and interviews with representatives of these stakeholders or stakeholder groups. In order to arrive at a generic framework of stakeholders, the literature was crossed with the input from each of the demonstrations. First of all, based on the literature and the expert knowledge within the STRAIGHTSOL consortium, a first provisional list of stakeholder groups was drawn. Each of the actors involved in a STRAIGHTSOL demonstration was then assigned to one of these categories together with their objectives. The objectives of the actors in one stakeholder group had to match, otherwise, the actor was placed in another stakeholder group or the list of stakeholder groups was adjusted. Drawing up a final list of urban freight stakeholders was a long process including multiple reviews and adaptations. The academic partners of the STRAIGHTSOL project confronted the stakeholders of the demonstration they were involved in with the provisional list of stakeholders and criteria. Their feedback confirmed the relevance of the choices made, but also led to some adaptations. Furthermore, this adapted list was also submitted to the European Reference Group of the project. The latter's comments and remarks resulted in further adaptations. To sum up, based on a literature review on the topic and with the backing of all the partners within the project, five relevant stakeholders in the urban and urban–interurban freight transport context are finally considered: (i) the shippers, (ii) the receivers, (iii) the logistics service providers, (iv) the local authorities and (v) the citizens living and consuming in the urban area under consideration (STRAIGHTSOL, 2012a).

### 2.3. Stakeholders' objectives

The objectives between different groups of stakeholders are diverse and can sometimes be conflicting. Stakeholders try to optimize their activities according to their own interests, independently of their neighbors' interests (Melo & Costa, 2011). This section explains the different interests of the stakeholders involved.

#### 2.3.1. The shipper

Shippers generally send the goods from the warehouses they operate. They can be manufacturers, wholesalers or retailers. The goods are then delivered to the receivers who can be the final consumer or an intermediate. Through their interactions, shippers and receivers both act upon the logistics system by influencing the locations where economic activities take place. Because the shippers aim at satisfying the receivers – their customers – by providing a high-level service, shippers and receivers partly share the same interests including, for example, green concerns. Both also want high accessibility between them (Behrends, 2011). High accessibility can be divided into different sub-objectives, but the main aim of shippers and receivers is to keep the cost of logistics as low as possible. The shippers also favor secure, punctual and with damage-free pick-ups. However, to understand this stakeholder group it is important to stress that only the shippers are usually in contact with the transport operators (Dablanc, 2011). They are the customers of the transport operators (Melo & Costa, 2011). They contract the services of the freight carriers on behalf of the receivers. This makes ordering easier for the receiver, while contributing to the competitiveness of the shippers' product. This results in additional

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