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# A stakeholder-based methodology to enhance the success of urban freight transport measures in a multi-level governance context

Bram Kin<sup>\*</sup>, Sara Verlinde, Koen Mommens, Cathy Macharis

MOBI – Mobility, Logistics and Automotive Technology Research Centre, Vrije Universiteit Brussel, Pleinlaan 2, Brussels, 1050, Belgium

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## ABSTRACT

Urban freight transport (UFT) is fundamental to the liveability of our cities, but it also contributes to the unsustainability of the same cities. Local authorities are primarily responsible for governing urban areas and implement different measures to regulate UFT. Measures often fail as they do not reach their intended goal and sometimes even produce adverse effects. One of the primary causes is that prior to implementation, the different stakeholders affecting and being affected by the UFT are not sufficiently involved. In this study, the multi-actor multi-criteria analysis (MAMCA) is applied ex-ante to evaluate to what extent different measures contribute to the objectives of different stakeholders. A municipality in Belgium, experiencing a lot of traffic, is used as a case study. Regulating UFT is in this case further complicated due to multi-level governance with different jurisdictions over infrastructure. To our knowledge, there are no similar UFT studies in a multi-level governance context. Results show that all proposed measures are an improvement for all stakeholders compared to the current situation. Future implementation of measures in this context is discussed.

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## 1. Introduction

The majority of the people, economic activities and consumption are concentrated in urban areas. A constant supply of goods is vital for the liveability of our cities (Lindholm, 2013). Consequently, a large number of freight vehicle movements is generated. Although freight vehicles only represent 8–15% of the total traffic flow, their share in transport-related emissions can be up to 50% (Dablanc, 2007). Freight vehicles contribute disproportionately to the unsustainability of cities with regard to economy (e.g., congestion), society (e.g., noise and unsafety) and the environment (e.g., air pollution) (MDS Transmodal, 2012; Quak, 2008). Nonetheless, only for the past years, the topic of urban freight transport (UFT) has been on the agenda of local authorities (Cherrett et al., 2012; Dablanc, 2007; Lindholm & Behrends, 2012; Lindholm, 2013; Stathopoulos, Valeri, & Marcucci, 2012).

Local authorities regulate UFT with measures such as time windows, the provision of (un)loading zones, low emission zones,

and weight and size restrictions (Anderson, Allen, & Browne, 2005; Muñuzuri, Larrañeta, Onieva, & Cortés, 2005). Based on the evaluation of 106 possible measures, Quak (2008), nevertheless, concludes that they often do not reach their intended goal. One of the core reasons is that, the interests of different stakeholders in an urban (freight) context are not sufficiently taken into account in the decision-making process prior to implementation (Behrends, 2011; Bjerkan, Sund, & Nordtømme, 2014; Lindholm, 2013; Milan, Kin, Verlinde, & Macharis, 2015; Muñuzuri et al., 2005; Quak, 2008; Stathopoulos et al., 2012; Witkowski & Kiba-Janiak, 2014).

In this study, the multi-actor multi-criteria analysis (MAMCA) is applied to evaluate to what extent different UFT measures contribute to the objectives of stakeholders. The MAMCA explicitly incorporates the interests of different stakeholders in the decision-making process (Macharis, 2005). A case study is conducted in Mortsels, a municipality in the greater metropolitan area of Antwerp, in the Flanders region in Belgium. Mortsels experiences a lot of traffic. Decision-making for UFT is complicated due to multi-level governance with different jurisdictions (Marcucci & Stathopoulos, 2012; Marsden & Rye, 2010; Te Bovelde et al., 2016). Whereas the municipality is responsible for the sidewalks and parking, the regional government of Flanders is responsible for the provincial roads crossing through the city. The majority of the shops receiving

<sup>\*</sup> Corresponding author.

E-mail addresses: [bram.kin@vub.be](mailto:bram.kin@vub.be) (B. Kin), [sara.verlinde@vub.be](mailto:sara.verlinde@vub.be) (S. Verlinde), [koen.mommens@vub.be](mailto:koen.mommens@vub.be) (K. Mommens), [cathy.macharis@vub.be](mailto:cathy.macharis@vub.be) (C. Macharis).

freight flows is located along these roads.

The added value of this case study is twofold. On the one hand, the authorities – local and regional – are supported in their decision-making process (aid decision-maker in understanding problem and possible alternatives) as well as in the decision outcome (aid in value judgements about trade-offs between conflicting objectives). The MAMCA as an extension of traditional multi-criteria decision analysis (MCDA) methods contributes to this by incorporating different interests, bringing stakeholders together, and identifying their advantages and disadvantages with regard to measures (Macharis, Turcksin, & Lebeau, 2012; Ward, Dimitriou, & Dean, 2016). A better understanding of the impact of measures on the different stakeholders enhances their success as potential bottlenecks are identified early in the process. On the other hand, the study contributes to UFT research. To our knowledge, there are no similar UFT studies in a multi-level governance context. Usually, solely the local authorities are taken into account (e.g., STRAIGHTSOL, 2014). However, as Lindholm (2012) mentions: “The regional or state governments also affects the urban freight through overall policies and regulations that the local authorities need to consider, as well as there are, e.g. national road networks in some urban areas that are the responsibility of regional or state governments, ...” (p. 90 Lindholm, 2012).

The next section provides a literature review on sustainable UFT, stakeholder involvement and evaluation methodologies. In section 3, the MAMCA methodology is elaborated. Section 4 deals with the application of the methodology, including a case description, the stakeholders, criteria and weights. In section 5 the results are presented, followed by a discussion in section 6. Finally, the conclusions and avenues for future research are presented.

## 2. Literature review

### 2.1. Sustainable urban freight transport

Based on extensive literature studies, Quak (2008) and Verlinde (2015) give an overview of the negative impact of UFT with regard to three aspects of sustainability: society, environment and economy. Improving sustainability of UFT is, amongst others, complicated because of a fragmentation of several freight flows; increased frequency, more delivery addresses and smaller volumes, driven by the growth of home deliveries, lower inventory levels and just-in-time deliveries (Alho & de Abreu e Silva, 2014; Macharis & Kin, 2017). The resulting inefficiencies reveal themselves in the unnecessary presence of freight vehicles in urban areas due to low vehicle fill rates and empty running (Arvidsson, 2013). At the same time, one should be aware that UFT is highly heterogeneous and includes diverse freight flows; i.e., consumer goods to organized retail chains, to independent retailers, to individual households, but also flows of perishable goods to hotels-bars-restaurants (horeca), large flows to constructions sites and waste-related flows (Dablanc & Rodrigue, 2014). Not all flows are inefficient; organized retail is for instance often characterized by full-truckload (FTL) shipments (Quak, 2008).

Local authorities are either less concerned or not aware of the interests of companies when they implement UFT measures (Ballantyne, Lindholm, & Whiteing, 2013; Lindholm, 2013; Macharis & Kin, 2017; Witkowski & Kiba-Janiak, 2014). Therefore, measures might not reach their intended effect or even produce adverse effects. Exemplary in this regard is a truck restriction policy in Manila during certain times as well as on central roads. In order to offer the same service level towards their customers, logistics service providers (LSPs) deployed more freight vehicles during a shorter period leading to more vehicle kilometres (Castro & Kuse, 2005). A study in São Paulo shows that restrictive measures

increased vehicle kilometres because of detours (Vieira & Fransoo, 2015). In Europe, several studies show that the lack of harmonization of policy measures between cities causes inefficiencies and negative environmental effects (Dablanc, Diziain, & Levifve, 2011; Quak, 2008; Russo & Comi, 2010; Van Binsbergen & Visser, 2001). Clearly, measures tailored to everyone's needs are not easily available. However, some form of harmonization has benefits, particularly for shippers and LSPs (Akyol & Koster, 2013; Muñuzuri et al., 2005; Russo & Comi, 2010).

Plenty of studies give an overview of different measures to regulate UFT (Anderson et al., 2005; Macharis & Kin, 2017; Muñuzuri et al., 2005; Quak, 2008). Herein a distinction between two types of efforts can be made. On the one hand, there are measures that are solely the responsibility of the authorities as they are the ones governing urban areas (e.g., time windows, provision of unloading zones). On the other hand, companies are changing their UFT operations in an urban context that is regulated by authorities. Eventually, they are the ones responsible for the majority of the movements of goods (Ogden, 1992). In the latter case, the degree of involvement of the local authorities varies. Off-hour deliveries, for example, are the responsibility of a company. However, in different cities, local regulations have to permit them. Despite the type of measure and degree of involvement, consultation is stressed as essential before implementation (Bjerkan et al., 2014; Lindholm, 2013; Österle, Aditjandra, Vaghi, Grea, & Zunder, 2015). In recent years, more collaboration, coordination and alignment between different stakeholders in the UFT context emerged. A Freight Quality Partnerships (FQP) is an example in this respect. A FQP is used to address freight topics on a structural basis. Varying stakeholders are included (i.e., different municipal departments, environmental groups, retailers, LSPs, shippers and the local community) (Lindholm & Browne, 2013). The advantages and disadvantages of measures remain, nevertheless, dependent on the stakeholder considered as well as on the local context. The latter refers to the current infrastructure, morphology, the (freight) transport issues, and the jurisdiction and resources of the authorities (Kin, Verlinde, van Lier, & Macharis, 2016; Lindholm, 2013; Macharis & Melo, 2011; Muñuzuri et al., 2005; Timms, 2014).

### 2.2. Stakeholders and their objectives

A stakeholder is anyone who has an interest in a problem by: 1) mainly affecting it, 2) mainly being affected by it, or 3) both (Banville, Landry, Martel, & Boulaire, 1998; Macharis, 2005). Stakeholders have different interests, which are possibly conflicting. Conflicting interests between stakeholders are put forward as one of the main constraints to move to more sustainable UFT. More generally, studies in both UFT and other fields show that the difficulty, or even the lack, of stakeholder involvement in the decision-making process is the main shortcoming in reaching the intended goals (Beierle, 2002; Lindholm, 2013; Luyet, Schlaepfer, Parlange, & Buttler, 2012; Macharis, 2005; Macharis et al., 2012; Reed, 2008). Stakeholders mostly identified in the UFT context are the receivers, LSPs, shippers, local authorities and citizens (Behrends, 2011; Milan et al., 2015). Fig. 1 shows the different spaces where these stakeholders meet as well as their main objectives.

Two remarks should be made with regard to these stakeholders. First, these groups are the most common ones, but depending on the context, other stakeholder groups might also be identified (e.g., a public transport company). Second, each stakeholder group is heterogeneous. Local authorities consist of different departments. Their interests might be affected differently by UFT. A receiver can be a big organized retail chain, the manager of a construction site but also a restaurant. The same goes for the other stakeholder groups and consequently a sub-division could be made. In section

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