Designing a framework for assessing the role of rail in urban freight distribution from a welfare-economic and business point of view

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1 Problem definition and objective of the research

This paper is part of a study which will design a tool to estimate and evaluate the potential of rail transport in urban freight distribution. It gives the framework for a conceptual model in order to assess the feasibility of rail transport in urban freight distribution from a welfare-economic and/or business point of view and in order to determine the success factors.

Many different types of goods are transported to and delivered in cities. Different sectors are involved in this process, for example the retail, construction, hotel and catering industry. Furthermore, different types of goods flows can be distinguished, such as B2B, B2C and waste collection. These logistics activities engender benefits such as waste that is removed from the city, or home-deliveries for people that are not mobile. However, they also cause some issues in the urban freight context, such as vehicle movements within the city and one-way traffic flows towards the city. Hence, the transport of different goods to, away from and within cities results in business, environmental and social costs. Forecasts indicate that the transport of goods will even grow in the future (Benjelloun & Crainic, 2008; Taniguchi, Thompson, Yamada, & van Duin, 2001). Bous (2001) for example predicts an increase of the transported goods volume of 100% between 2001 and 2020 and a rise of the road transport (in tkm) of 200% between 2001 and 2030. As a result, the issues mentioned here are likely to increase as well, making urban freight distribution an even more interesting research subject, given the challenges ahead.

Besides, the growing population leads to extra transport movements, for example in cities (Bous, 2001). Since freight transport and passenger mobility interact with each other, these extra passenger movements also affect the freight transport to, away from and within cities. Moreover, an increased general awareness of the environment exists (Behrends, 2012; Dorner, 2001). The recent European Transport White Paper states that European governments should try to implement policies to optimise freight transport in and around the city (European Commission, 2011). Behrends (2012) suggests to use more environmentally friendly transport modes, such as rail transport. This idea is also proposed by Ruesch (2001) who indicates the need for developing rail freight distribution concepts. In this context, this research examines the potential role of rail in urban freight distribution.

2 Research strategy and methodology

Previous research in this study shows that an appropriate methodology to assess the potential of rail for urban freight distribution is a social cost-benefit analysis. In order to develop a conceptual model, different parameters have to be taken into account which are often case-dependent. Due to the complexity of urban freight distribution and its interaction with passenger transport, it is necessary to delineate the various typologies for which it is realistic to assume that rail transport could be potentially implemented in urban freight distribution and for which it is possible. These typologies will be the basis for the social cost-benefit framework.

During an expert meeting among academic, industry and government experts, six academic presentations were held related to the topic of this research. The experts discussed the results of the literature review of earlier stages of this study and gave feedback on the proposed typologies and methodology. They gave examples of experiences they had with rail as a mode for urban freight distribution and their view on specific issues in the social-cost benefit analysis for this research topic. These insights are applied to the Belgian context in a next stage of the research.

3 Major findings

The three main findings that result from this paper concerning the parameters needed as input for the social cost-benefit analysis and the business economic analysis are as follows.

Firstly, cities differ from each other with respect to several aspects. Important parameters concerning this are for example the population density, the available transport infrastructure, the geographic features of the city and the freight flows going to and away from the city and within the city. Therefore, parameters taking into account the city characteristics are used as input for the conceptual model.

Secondly, different types of goods have different characteristics. As a result, different goods might have to be treated in a specific way and thus require distinct transport conditions. Their cost structure differs according to parameters such as their delivery frequency, their required transport temperature and their value. Thus, the goods characteristics are a second main input for the developed model.

Thirdly, general parameters for the use of rail freight transport are included in the analysis. Examples of these parameters (Ballis & Golias, 2002; Tirachini, Hensher, & Jara-Díaz, 2010) are infrastructure costs, direct operational costs, maintenance costs, wages, overhead costs and potential benefits with respect to time gains and consolidation. Since the cost-benefit analysis is also developed from a social point of view, social costs and benefits are included. Important parameters that are considered here are emissions, congestion and access restrictions in certain areas.

The analysis shows that to develop a social cost-benefit model to an urban freight context, specific parameters, such as the characteristics of cities and goods have to be included in the analysis next to cost and benefit components that are generally used in an SCBA. Moreover, time gains are limited in an urban freight context, while they account in general for a large part of non-monetary benefits in SCBAs. These context-specific aspects make the SCBA in an urban context different from general SCBAs. The developed conceptual model will in further stages of this research be applied to one or more case studies in Flanders.

4 Keywords

Urban freight distribution, rail transport, city

5 References

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