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Strategic scenarios for sustainable urban distribution in the Brussels-capital region using urban consolidation centres

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Abstract

This paper describes a methodology that was used in order to establish strategic scenarios for city distribution of goods in the Brussels-Capital Region (BCR) using Urban Consolidation Centres (UCCs). Recently, UCCs received a lot of attention as a solution to decrease the environmental impact of urban freight transport in the Brussels-Capital Region. However, despite the growing interest from both public and private actors, many questions regarding their practical implementation remain. In fact, there are a large number of uncertainties with regards to the implementation of the consolidation scenarios, such as the number, location and size of the UCC(s), the vehicle fleet, the regulatory and market framework or the operational agreements. This leads to a large number of possible scenarios. In this paper, authors describe a scenario-planning methodology that was applied in order to select a limited number of scenario themes. Authors present several quantitative models that were used to evaluate possible scenarios and select the most relevant ones.

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1. Introduction

The Brussels-Capital Region (BCR) is increasingly aware of the negative impacts of freight vehicles on the urban welfare. Vans and trucks were indeed estimated to be responsible of a third of fine particles generated by the transport sector and of a fourth of CO₂ emissions (Lebeau and Macharis, 2014). They account also for 14% of the vehicles on the road. Given the important contribution of these vehicles on mobility, air quality and climate change, different type of solutions have been planned by the authorities in their strategic plan for urban freight transport in

the BCR (Bruxelles Mobilité, 2013). Among others, the Urban Consolidation Centre (UCC) receive a specific attention in that plan. It has been one of the most investigated solutions in the Region. Several research papers (Hubert et al., 2008; Debauche and Duchateau 1998; Van Mierlo et al., 2004) have indeed addressed the implementation of a UCC in Brussels. Recent years have also seen some concrete steps, with the setting-up of several small UCCs in the region, run by private companies. Still, regional authorities require more insights in the possible future developments. In order to take decisions, they must address a large number of questions such as: (1) how many consolidation centres are necessary to service the Region? (2) what is the optimal size and location of these centres? (3) what part of the freight demand are they likely to capture? (4) is their operation possible without public subsidies? (5) what is the impact of other accompanying measures on their development? (6) what are the environmental impacts of such schemes? (7) what type of vehicles are best suited? (8) how will the urban stakeholders respond to different policy options? The multiplication of options leaves the decision-makers in front of a large number of uncertainties and dimensions of analysis. Hence, the paper has the objective of giving a method to tackle this complexity. A scenario-planning methodology is described and applied on the case of the BCR in order to select a limited number of scenario themes that can be evaluated. The different quantitative models that support that methodology are also presented.

2. Methodology

The methodology that was used for constructing strategic scenarios is scenario planning and comes from the field of strategic planning. Scenario planning is a systematic methodology method for designing possible futures that simplifies the avalanche of data into a limited number of possible states (Schoemaker, 1995). It differs from other planning methods as contingency planning which examines only one uncertainty and the sensitivity analysis that examines the effect of a change in one single variable (Schoemaker, 1995). According to Chermack et al. (2001), the two academic approaches most often cited in the field of scenario planning are those by van der Heijden (2011) and Schoemaker (1995). Although different scenario planning approaches differ in their details, they share certain characteristic process steps (Wulf et al., 2010): (1) Definition of the scope; (2) Perception analysis; (3) Trend and uncertainty analysis; (4) Scenario building; (5) Strategy definition and (6) Monitoring. Scenario planning is an iterative methodology, but for better reader comprehension, this article will be structured around the subsequent steps. The article focuses on the first four steps of the process that lead to the elaboration of strategic scenarios. In the fifth step (“strategy definition”), public stakeholders can use results of the scenario building and evaluation to define and communicate a proper strategy in terms of public policy required to promote the shift towards the optimal scenario, while private stakeholders can use these results in order to anticipate market developments and adapt their business strategy. The last step of the scenario building methodology (“monitoring”) corresponds to the development of performance measurement system with specific KPIs that allow overseeing the implementation of different strategies.

We will now address each of the first four steps of the scenario building methodology and explain their application to the particular case of scenarios for sustainable urban distribution in the BCR using UCCs.

2.1. Definition of scope

The first step of the scenario-planning methodology is the definition of the scope that sets the foundation for the analysis and strategy definition phases by specifying important characteristics for the scenario planning project such as the time frame, the commodity type and the market segment, geographic area or scope of analysis (Wulf et al., 2010; Schoemaker, 1995; Van der Heijden, 2005).

We will delimit the scope of scenarios using the following elements: (1) which types of UCCs are to be considered for the strategic scenarios? (2) which market segments are to be targeted by the UCCs in the BCR? (3) which is the geographical coverage of UCC services? (4) what is the time frame of the implementation of the strategic scenarios?

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