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Costs and Benefits of Logistics Sharing for Urban Freight Distribution: Scenario Simulation and Assessment for Strategic Decision Support

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Abstract

The freight transport sector is a major source of employment and often plays an important role in the economic development of regions and countries. However, freight transport is also a disturbing activity, due to congestion and environmental nuisances, more particularly in urban areas (Crainic, 2008). In urban context, city logistics has been developed for more than fifteen years, giving solutions and methods to support public authorities and also other stakeholders in urban freight transport planning and management (Taniguchi et al., 2001). One of the most popular solutions related to city logistics is that of urban consolidation centres (UCC). An UCC is defined by Allen et al. (2007) as “a logistics facility situated in relatively close proximity to the geographic area that it serves (be that a city centre, an entire town or a specific site such as a shopping centre), to which many logistics companies deliver goods destined for the area, from which consolidated deliveries are carried out within that area, in which a range of other value-added logistics and retail services can be provided”. Because of their very central locations, UCCs often require significant real estate expenditures, which are generally covered by public funds, and these systems require also extra support to ensure their economic continuity (Dablanc et al., 2010). For these reasons, UCC in Europe are currently resumed to a few operationally rentable cases, most of them in Italy.

Another solution is that of logistics pooling, that can be defined analogously to car-pooling as the common usage of logistics resources: material (vehicles, platforms), human (drivers, land operators) and immaterial (software tools, information). We observe several projects dealing with urban logistics resource sharing in the last years, most of them being still at a development phase (Gonzalez-Feliu and Morana, 2011). Most of these projects aim to make a semi-closed group of collaborators who share vehicles and platforms to reduce their logistics costs and the environmental nuisances related to last mile distribution in urban dense zones. In 2009, a project financed by a research and development cluster in the Paris Metropolitan Region, called LUMD (Logistique Urbaine Mutualisée Durable, urban mutual sustainable logistics), aims to develop a new type of collaboration: that of a logistics community based on a specific urban e-marketplace platform where logistics demands and offers converge, resulting on better loaded vehicles and most efficient logistics platforms. The first part of the project has spent three years for the virtual pooling platform conception and development.

The last stage of LUMD development is the assessment of several scenarios for the development of an electronic platform to support logistics sharing. This stage is important since the performance of the system will be assessed “ex ante” (Filippi et al., 2010) and will motivate public authorities for the implementation of a pilot phase, in Strasbourg (France), mid 2012.

This paper proposes to present the methodology for scenario assessment and simulation in the context of LUMD project, as well as to show the main results of this first phase. The proposed research shows the link between base research in various disciplines (applied mathematics and modelling, urban economics, computer science) and their application in a commercial tool for operational planning. First we present the main concepts of logistics sharing, focusing on urban freight transportation. Then, an integrated simulation framework combining an optimization module, a scenario generator and an environmental module is presented. After describing the method, the retained scenarios are described and simulated. Finally, the main results and future developments are presented and commented.

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