Available online at www.sciencedirect.com

ScienceDirect

Transportation Research Procedia 12 (2016) 348 – 356

Transportation Research Procedia

www.elsevier.com/locate/procedia

The 9th International Conference on City Logistics, Tenerife, Canary Islands (Spain), 17-19 June 2015

Evaluate the viability of Urban Consolidation Centre with regards to urban morphology

Lucile Faure, Patrick Burlat, and Guillaume Marquès*

Ecole des Mines de Saint-Etienne – CNRS UMR5600, 158 cours Fauriel – CS 62362, 42023 Saint-Etienne Cedex 2, France

Abstract

City logistics is a difficult topic for public decision makers who often lack relevant information and knowledge to make their decisions. Among all available solutions, Urban Consolidation Centre is an appreciated one. Indeed, it is supposed to reduce pollution, trucks' congestion and to improve the livelihood of city centre. Nevertheless, it is far from obvious that UCC are efficient and viable. The aim of this study is to provide answers to two questions: can an UCC be viable? Does the shape of a city affect the profitability of an UCC? We present a preliminary work based on a comparison between three morphologies to give some clues.

Peer-review under responsibility of the organising committee of the 9th International Conference on City Logistics

Keywords: Urban Consolidation Centre; Profitability; City Logistics; Economic Assessment

1. Introduction

More than 20 years ago, Ogden (1992) already pointed out the necessity to elaborate sustainable urban freight transport policy to face the urbanization. Nowadays, city logistics is becoming a strategic, but always under-used, lever to urban development. Indeed, although a small part of complex supply chains, this last link can represent up to 28% of the total transport cost (Roca-Riu and Estrada, 2012). Moreover, air pollution emissions related to urban freight transport are estimated between 16% and 50% of the overall pollution made by transport activities in a city

* Corresponding author. Tel.: +33477420114; fax: +33477426633.
E-mail address: lfaure@emse.fr

Peer-review under responsibility of the organising committee of the 9th International Conference on City Logistics
doi:10.1016/j.trpro.2016.02.071

(Albergel et al., 2006). Hence, it is necessary to provide sustainable solutions to relieve the traffic congestion on city centres and reduce the environmental impact of urban freight transport (Thompson, 2015). It is known that designing efficient transport facilitates small businesses, shops and boutiques, and therefore improves livelihood and liveability of cities (Taniguchi et al., 2014).

The sustainability imagined by Ogden is not yet a reality. Lately, OECD (2003) reports that communal decision-makers and town-planner lack knowledge about city logistics. Finally, they often fail to deploy relevant local public policies to face these stakes (Dablanc, 2007). Actually, a lot of approaches are based on "Try and See" experiments which are efficient to obtain ex post knowledge but not to provide a decision support (Thompson, 2015). Consequently, many researchers demonstrated the need to conceive model-based ex ante assessment of city logistics solutions (Russo and Comi, 2011; Taniguchi et al., 2003). Such models would aim at providing pertinent information beforehand when designing a city logistics solution.

Among city logistics' solutions available in literature (Allen et al., 2007; Boudouin, 2006), we choose focusing on a pooling solution: Urban Consolidation Centre (UCC). This is the most popular type of pooling solution in European cities to deal with city logistics issues (Chwesiuk et al., 2010; Van Duin and Muñuzuri, 2015). Unfortunately, as mentioned in the OECD report (2003), among more than 200 experiments in Europe, only 15 UCC are always active after 5 years of life. Hence, it seems interesting to find out why these good theoretical solutions often fail in real world.

Different studies enlighten the need for anticipating the demand (Marcucci and Danielis, 2008; Nuzzolo and Comi, 2014), the activity level (Battaia et al., 2014; Roca-Riu and Estrada, 2012) or the environmental impact (De Assis Correia et al., 2012). In this paper, we will contribute to demonstrate the potential offered by enabling model-based ex ante assessment of solutions using an economic approach.

The choice for a given business model (i.e. commercial links with stakeholders, market segmentation and pricing) has been pointed out as a cause of successful/failure (Armand et al., 2013; Gonzalez-Feliu et al., 2013). That is why some researchers carried out economics analysis using costs/benefits exploration or other methods (De Assis Correia et al., 2012; Quak and Tavasszy, 2011; Van Duin et al., 2008) to anticipate the impacts of business models onto profitability.

Kawamura and Lu (2007) proposed a new way to evaluate the viability of UCC by using Continuous Approximation models. Based on the logistics analysis described by Daganzo (2005), they developed an approach to calculate per items costs in the case of UCC in the United States. More recently, they proposed an extension of the problem and applied it on larger markets (Chen et al., 2012; Lin et al., 2014). The approach used is able to find tipping point in a comparative point of view. Indeed, they compare two situations: one without consolidation and one with consolidation. They obtained interesting results showing, e.g. the minimum customer demand, customer density or load factor, to reach the cheaper logistics costs. However these mentioned studies are in an US context which is different from the European context, especially for size of flows and capacities of warehouses. That is why Roca-Riu and Estrada (2012) have conducted a similar study in the European case of Barcelona.

In this study, they attempt to check the viability of UCC by exploring if a delivery through the UCC is more economical for each involved actor than the current direct delivery. The aim is to provide a help for predicting the minimum number of contributing carriers to ensure the feasibility of the project. Finally, such studies provide interesting information about the opportunity for transport companies to join collaborative network such as UCC. However, in the competitive and rigorous context of urban delivery, a new organisation has to determine sale price with regards to the market. Thus, at the beginning of the activity, a risk exists in the economic viability of this organisation which has to catch flows to grow. That is why it seems important to complete the information given by Roca-Riu and Estrada (2012) and Lin et al. (2014) with an operational approach. Actually, we suggest looking at the inbound costs of UCC to answer a first question: Can an UCC be viable in a European middle-size city?

To go further, we would like to identify some keys of the economic results of an UCC. We observe in the literature that UCCs known as viable have always some specific particularities often related to the morphology/geometry shape of the city centre: Monaco is completely isolated; Parma owns a tight historical centre with constraints on accessibility, etc… Thus, one may wonder whether the shape of a city is an important clue for successful/or failure of UCC. That is why we propose in this paper to assess the influence of urban morphology on the economic viability of UCC in a medium-size city. In the rest of the paper, urban morphology and shape will be used as synonym. It represents the shape formed by delivery points when looking at a large scale the city centre.