



Contents lists available at ScienceDirect

## Research in Transportation Economics

journal homepage: [www.elsevier.com/locate/retrec](http://www.elsevier.com/locate/retrec)

## Critical factors for viable business models for urban consolidation centres

Maria Björklund\*, Mats Abrahamsson, Henrik Johansson

Division of Logistics and Quality Management, Department of Management and Engineering, s-581 83 Linköping, Sweden

### ARTICLE INFO

#### Article history:

Received 27 November 2015  
 Received in revised form  
 21 October 2016  
 Accepted 22 December 2016  
 Available online xxx

#### JEL classification:

R41  
 R48  
 R11  
 R12  
 R40

#### Keywords:

Urban logistics  
 Business models  
 Critical factors  
 Urban consolidation centres

### ABSTRACT

Although urban consolidation centres (UCC) worldwide have improved urban freight distribution and reduced externalities, other UCC initiatives have not materialised due to problems such as for example, business model limitations. All the same, researchers have rarely described business model components relevant to city logistics. In response, the purpose of this article is to analyse critical factors for viable business models of city logistics initiatives involving UCCs. Following an extensive literature review and multiple-case study of five initiatives with UCCs, we identified seven critical factors of viable city logistics business models: the ability to scale up and down the UCC solution; an ability to continuously develop and adapt to a dynamic environment; the important entrepreneurial role of the initiator as well; the acknowledgment of society; ability to innovate new services; logistics and supply chain management competence; and the ability to take full advantage of advanced IT. All seven factors describe continuously redeveloped business models seeking to seize new and unexpected opportunities, yet also indicate that city logistics systems require local authorities and municipalities to act as initiators, enablers, and customers. The models also underscore differences between purely commercial and purely municipal city logistics initiatives.

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### 1. Introduction

Although freight transport in general and urban freight transport in particular (also known as last-mile delivery) are necessary for urban development and cities' financial viability, urban freight poses numerous problems, including pollution, noise, and congestion (Allen, Browne, & Holguín-Veras, 2015). Furthermore, given the expanding populations of cities worldwide, the negative effects of urban freight have only worsened. Since urban freight operates within the domain of city logistics, city logistics initiatives face the challenge of resolving the many economic, social, and environmental problems in today's urban areas. (Lindholm et al., 2014).

Business models are often identified as playing a key role for city logistics initiatives, and as often, their absence poses a major barrier to the implementation of such initiatives (Malhene, Trentini, Marques, & Burlat, 2012; Quak, Balm, & Posthumus, 2014).

However, many of today's city logistics initiatives are not business driven, but technologically driven and focus on the technical, environmental, and operational feasibility. Although the consideration of financial feasibility in these initiatives is commonly weak (Quak, 2011), the long-term survival of city logistics solutions requires viable business models that also consider financial feasibility (Quak et al., 2014).

Following a review of city logistics literature addressing business models, Björklund and Abrahamsson (2015) concluded that knowledge about what actually constitutes a business model in city logistics remains scant. To product viable city logistics solutions, it is not enough to only consider all components in business models. More importantly, city logisticians need to examine how those components are designed and why. To that end, initial developers have to determine several aspects of their initiatives in designing corresponding business models, including viable collaborators, potential customers, preferred value offerings that can generate revenue, essential resources, and organisational arrangements and roles therein. This is not only a knowledge gap with regard to city logistics. After reviewing more than 600 articles on business models in general, Wirtz, Pistoia, Ullrich, and Göttel (2016)

\* Corresponding author.

E-mail addresses: [maria.bjorklund@liu.se](mailto:maria.bjorklund@liu.se) (M. Björklund), [abrahamsson@liu.se](mailto:abrahamsson@liu.se) (M. Abrahamsson), [henrik.b.johansson@liu.se](mailto:henrik.b.johansson@liu.se) (H. Johansson).

conclude that the knowledge obtained thus far on essential success factors of a business model is rudimentary.

To form our sample, we specifically targeted city logistics initiatives representing urban consolidation centres (UCC), characterised as systems that decouple long-distance transport, typically with large trucks, and last-mile transport within urban areas, often with vehicles designed for urban transport.

In this article, we strive to generate knowledge about why some business models for UCCs are viable and why others fail. We are using the term viable in this study to describe if the city logistics systems, over time, provide the values and goals defined by the owners/initiators of the system. This is either the city administrators (UCC systems initiated by a municipality) or the part owners (private UCC initiatives). The purpose of this article is: *to analyse viable business models of UCCs initiatives in order to identify and describe critical factors in these models.*

## 2. City logistics business models

Defining an appropriate city logistics business model is arguably foundational for stakeholders in city logistics initiatives such as UCCs (Macário, Galelo, & Martins, 2008). Indeed, before identifying components of city logistics business models, it is critical to form a proper understanding of what business models for city logistics can be. Although literature on city logistics and urban freight offers no formal definition for business models for city logistics, much less models for UCCs in particular, a business model in general can be defined as:

[A] conceptual tool that contains a set of elements and their relationships and allows expressing the business logic of a specific firm. It is a description of the value a company offers to one or several segments of customers and of the architecture of the firm and its network of partners for creating, marketing, and delivering this value and relationship capital, to generate profitable and sustainable revenue streams" (Osterwalder, Pigneur, & Tucci, 2005, p. 10).

Despite the importance of business models described in recent city logistics research (cf. Malhene et al., 2012; Quak et al., 2014), few researchers have provided profound insights into the design of viable business models. However, two studies have provided insights into the content of city logistics business models. First, in identifying business models as one of five parts in the taxonomy of city logistics projects, Benjelloun, Crainic, and Bigras (2010) posited that city logistics projects need to address critical aspects regarding, for example, financing and management. Second, based on the nine components of the business model canvas proposed by Osterwalder and Pigneur (2010), Turblog (2011) presented an urban logistics business model canvas that, in addition to the component of externalities (e.g., value proposition for society), identified the components of key partners, key activities, key resources, revenue streams, cost structure, customer segments, customer channels, customer relationships, and value proposition to customers, as explained in what follows.

### 2.1. Actors, initiators, and owners

Different stakeholders are involved and interact with each other in city logistics initiatives (cf. Anderson, Allen, & Browne, 2005). In the city logistics system proposed by Benjelloun et al. (2010), the five stakeholder groups put forward are: shippers; carriers and warehousing companies; the city; the government; and others such as citizens, consultants, and universities. In a similar way Taniguchi, Thompson, Yamada, and van Duin (2001) put forward four key

stakeholders involved in urban freight transport: shippers (manufacturers, wholesalers, and retailers); residents (consumers); freight carriers (transporters and warehouse companies); and administrators (national, state, and city level). This shows the large variety of different stakeholder that can be involved.

The stakeholders' role(s) in different initiations can vary largely. Lindholm (2012) present two forms of stakeholders: those who have a direct interest or effect on urban freight transport and those who have an indirect interest or effect on urban freight transport. The roles of having an indirect or direct interest and effect could also be applicable when it comes to the roles of different actors in the business models for city logistics. There are some actors in the business model such as key partners and key customers (cf. Shafer, Smith, & Linder, 2005) that can be seen as directly involved in the business models ("need to make an agreement with") and other actors who have to be informed/listened to, but are not directly involved.

However, actors in a city logistics business model might not be the same actors involved in or affected by the city logistics initiative. In describing business models for city logistics, Benjelloun et al. (2010) stated that a city logistics project needs to address critical issues of financing and viability in light of four criteria: infrastructure financing (i.e., Who finances?), operation financing (i.e., Who finances and when?), management (i.e., Who is the manager?), and competitive advantage. By answering those questions and fulfilling those criteria, the roles and activities of more directly involved actors can be better specified.

Research in the field often presents business models for city logistics initiatives without clearly identifying the owner in the model. However, it is critical to pinpoint whose model it is—that is, the owner of the model or the firm or company that uses the model—in order to define roles and requirements. To that end, in urban freight systems in particular, three different groups are commonly described as capable of implementing changes: public policy makers; freight transport companies; and receivers (Allen et al., 2015; Awasthi & Chauhan, 2012; Cherrett et al., 2012; Malhene et al., 2012; Österle, Aditjandra, Vaghi, Grea, & Zunder, 2015). Muñuzuri, Larrañeta, Onieva, and Cortés (2005) adds goods owners, who could also be the senders, as another group of potential actors. However, logistics companies, authorities, and goods owners differ widely regarding, for example, resources such as competence and equipment. Since key resources are a major component in the business model, business models might differ depending on the initiator and to what extent initiators influence how the models are characterised.

### 2.2. Activities and resources

A business model can be described as 'the set of *which* activities a firm performs, *how* it performs them, and *when* it performs them as it uses its resources to perform activities, given its industry, to create superior customer value (Afuah, 2004). For UCCs, warehousing, handling, and distribution are arguably the first activities that come to mind. In business models for city logistics, the management, planning, and development of initiatives can also be described as important activities.

Meanwhile, Abrahamsson, Aldin, and Stahre (2003) have posited that the management and control of logistics performance are activities engaged by central actors in logistics platforms. This makes the city logistics business model similar to what in literature is described as "logistics-based business models". A logistics-based business model incorporates activities along the entire supply chain, including internal as well as external coordination of the flow of goods. In consequence, the design of the logistics platform as well as the management and control of the logistics performance

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