Health Care Logistics in an Urban Environment: A Market Typology and Decision Matrix
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Extended abstract

Objectives and motivation
Little research has been performed within the field of health care logistics towards and within cities. Other goods flows like retail and e-commerce are investigated more often. There are several reasons for this evolution. First of all, many literature is focussing on new innovations and policies in which the authors investigate the city as an entity. With this approach, the effect on a specific sector is not examined. Examples are innovations review papers concerning road pricing and urban distribution centres. Secondly, health care logistics were left aside because of the high number of constraints and limited interest of policy makers.

Nonetheless, the specific goods flows of health care are growing and new challenges emerge for this sector. This specific goods flow has a relatively high impact on city centres and evokes many traffic movements, pollution and noise during peak hours. The limited literature and the choice for the approach to target one specific goods flow in this paper, determines the way the paper is structured. Besides, the health care sector is, within the Flanders region of Belgium, a vulnerable sector in which there is always pressure on non-patient related supply chains. The efficiency of the health care logistics supply chain depends on different variables such as the lead time but also on several handling conditions and regulations.

The objective of this paper is twofold: the first objective is to gain more insights in the way health care logistics are structured and organised. Therefore, this paper builds different market typologies. Hereby, the specific characteristics of the goods are one of the main parameters. A second objective is to build a decision matrix based on the developed market typologies. This matrix provides the main stakeholders with a good guideline which market typology is the most appropriate for given goods or a specific situation. In the conclusion, this paper highlights some weak points of the supply chains and tries to list decisive variables which influence the costs of the main stakeholders.

In this research, there is special attention for the specific characteristics of health care goods and the expectations and behaviour of the different parties involved. The focus of this paper is on business-to-business goods flows. In particular, the deliveries from producers towards pharmacies but also hospitals and retirement and care villages located in city centres are examined.

More specifically, the paper answers the following research questions:
1. How are business-to-business health care logistics structured and organised?
   a. How to define health care logistics?
   b. Which business models are common in the sector?
   c. Which are the specific characteristics of the goods transported?
2. Which market typology fits best for a given type of good?
3. Which are weak points in the supply chain?
4. Which sector specific factors should be kept in mind during further policy formulation?

To come to this final goal, five research steps are performed.

In the first step, an extensive problem description is given in which the expectations of the main stakeholders and specific characteristics of health care goods are listed.Originating from this research, some key words and goods categories are defined in the second step. A third step describes observed delivery patterns in cities. The next, fourth, step brings these insights together which result in the development of four different market typologies. These market typologies are the base for the next step in which they are converted into a decision matrix. The development of this decision matrix is the core of this paper. Besides, the paper tries to highlight weak points in the current market organisation and structure. Originating from as well the decision matrix (building process) as the listed weak points, some recommendations to improve the efficiency of delivering health care goods to and within cities are formulated at the end of this paper.

To come to these answers, the following research strategy was followed. Originating from the fact that the existing literature and available data is rather limited, the research started with an extensive problem description compromising as well the academic as non-academic literature and the definition problem. The further steps in the research are based on observations within the Flanders region of Belgium. This method was improved by in-depth interviews with some business experts before and after each research step. These business experts were as well suppliers, producers, receivers and governing bodies.
General description
As already stated, there is a pressure on the health care supply chain as well from inside the sector as from outside. Originating from growing population, the demand for health care services will increase. Additionally, the trend towards urbanisation brings, by consequence, challenges for cities. Receivers, suppliers and governing bodies of health care goods sometimes face problems similar to the problems of other sectors like parking problems, noise and pollution regulations. But sometimes also very specific problems and constraints due to the specific characteristics and the special treatment health care goods need.

To find a bridge between these specific elements and the sector, this paper tries to categorise different types of goods. Some specific goods need similar treatment, other types of goods are subject to special regulations. More specific, blood, for example, requires very specific treatment in controlled boxes and a very short lead time. Other more common health care goods need a more standard delivery, similar to the one performed by, for example, e-commerce businesses (Gevaers, 2013). These factors together with sometimes a high price for specific goods evoke that transport is organised in a given way. Hereby, the impact of the behaviour of different stakeholders is linked with the impact these separate goods categories have on cities. For example, some goods have a really short expiry date which makes that they have to be delivered with a higher frequency towards pharmacies or hospitals. By consequence, these types of deliveries follow another delivery pattern than other - more standard - goods.

These observed delivery patterns are linked with the specific goods groups in four different market typologies in which the roles of the main stakeholders are always different. Depending on the perishability, cost price, demand pattern, applied regulation, special equipment needed, acceptable lead time other market typologies are more applicable for specific goods. Two main groups can be distinguished: producers/suppliers which outsource their logistics and deliveries and producers/suppliers which do not outsource.

In a next step, the different market typologies and decisive variables were converted into a decision matrix which is a good guideline for suppliers and producers. More particular, this matrix gives advices to producers/suppliers which delivery pattern is the best for their product category. On the other hand, the matrix is also a good guideline for receivers so that they can understand the way goods are delivered and that they can optimise their own order patterns.

At the end of this process, some specific recommendations are formulated. Hereby, the starting point was to distinguish the weakest points throughout the delivery supply chains. The specific recommendations give better insights in the influence of some decisive variables on cities.

Results and conclusions
Firstly, this research results in four different market typologies in which every stakeholder have other tasks and another role. The decision matrix learns that for given goods, it is better to use a given distribution (suppliers and producers) and order (receivers) pattern.

A concrete example are very expensive medicines with a low but sometimes urgent demand and a short expiry date. In this case, it is for the pharmacies better not to keep this medicine in their own stocks because of high costs. For the producer or logistic service provider, this behaviour means that they have to take the risk of warehousing which can be spread over many pharmacies (Blauwens, De Baere & Van de Voorde, 2012). The demand for the specific medicine can increase suddenly which provokes that an as quick as possible A-to-B delivery can be needed and, by consequence, the impact on the city is higher. For other products which are not that urgent and for which there is no risk that the quality is decreasing if the transport is performed by another party, the producer can easily outsource this transport to a logistic service provider.

Secondly, this research highlights some specific variables which characterise the sector and which should be kept in mind while formulating new innovations or policies.

An example is the regulation which states that some medicines should always be treated by pharmacists. This regulation implements that some goods flows cannot be outsourced to, for example, an urban distribution centre which can bundle these deliveries with other goods. By consequence, this organisation provokes additional costs in the supply chain.

References

Keywords: health care logistics, health care delivery patterns, health care market typology, health care goods