

# Smart Cities: Urban Logistics from the Customers Perspective

## Masterarbeit

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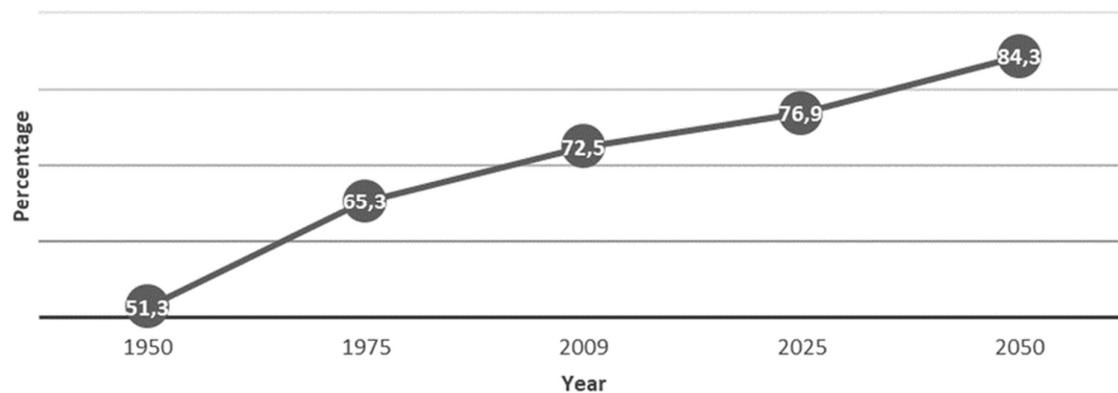
## 1. Introduction

### 1.1. Relevance and Motivation

*“Cities have the capability of providing something for everybody, only because, and only when, they are created by everybody” – Jacobs (1961)*

The notion of a smart city and its components have gained increasing popularity in international policies and academic literature within the last two decades (Albino et al., 2015). To understand the concept of smart cities, it is vital to acknowledge, that cities are an important element for economic and social growth and, as such, influence the environment (Mori & Christodoulou, 2012). A city can be differentiated from rural areas through its higher density of people, as well as higher population numbers in general. As a reference, agglomerations with more than 100,000 inhabitants are considered cities (BBSR, 2015).

Even though cities seem to be a driver for economic growth, they are also coupled with various challenges that occur specifically within urban areas. Nevertheless, populations have always been concentrated in cities, rather than in rural areas. Figure 1 represents the percentage of EU inhabitants living in urban areas. A huge growth in this number can be identified between 1950 and 2010, when the share of people living in cities rose from 50% to around 75%. By 2050, about 85% of the EU population is expected to live in urban agglomerations (Caragliu et al., 2011; OECD, 2003; UN, 2009):



**Figure 1: Percentage rate of EU-Citizens living in urban agglomerations, 1950-2050 (forecast); Source: Own representation based on UN (2009)**

This trend is not only noted in Europe, but also all around the globe. The significance of urban agglomerations as a rising trend is highlighted by the emergence of megacities with over 20 million inhabitants, especially in Latin America and Asia, but also in Africa. According to the UN, the first time over 50% of the world’s population

lived in cities was in 2008. That number is furthermore estimated to rise up to 70% by 2050. Consequently, urban agglomerations are places where most resources are consumed. To put it into numbers, cities and their inhabitants are assumed to consume between 60% to 80% of energy and are additionally accountable for a considerable proportion of emissions (UN, 2009).

One driver of consumption is urban freight traffic. Transportation vehicles compete for street as well as parking space and hence contribute to congestion and negative environmental side effects (OECD, 2003; Figliozzi, 2007). These inconveniences influence the life of people living or working in cities. Furthermore, online sales are steadily rising, leading to higher numbers of goods that need to be transported within urban agglomerations. All this should be taken into account when constructing a smart city worth living in. Moreover, smart solutions should be pointed out, which enable cities to reach improvements in terms of their productivity and efficiency and thus create a livable place for its inhabitants (Caragliu et al., 2011).

The smart city concept describes a fast-emerging trend within different industries as well as within the planning of new cities. One main factor of this construct is urban logistics. This notion involves all forms of transport, including freight transportation, passenger transportation and other related forms of transportation. The transportation of freight represents an important factor for most social and economic activities taking place in cities. It affects the supply of stores and private deliveries. For organizations established within city boundaries, it represents the connection with suppliers and customers. In fact, only a limited number of activities happening in cities do not require at least some goods to be transported (Benjelloun & Crainic, 2008). While considering new mobility possibilities with trends such as car sharing and ride sharing, and also the evolving automation of vehicles and ubiquitous connectivity, there are plenty of factors to consider when setting up new forms of urban transportation and logistics.

As the quote presented in the beginning states, cities should provide something for everyone (Jacobs, 1961). This may be either a good transportation infrastructure, but also low congestion zones or even emission free zones. While building up such cities, the main element of a city, the people living there, should not be neglected. (OECD, 2003). In this thesis, the inhabitants of a city are referred to as customers. These customers can be divided into private customers as well as business customers. If those customers are satisfied with what the city is offering, they tend to deliver more value which subsequently attracts even more inhabitants and thus leads to rising economic growth of the respective city. It is therefore important to consider all stakeholders for an effective city logistics system (Anand et al., 2012).

## 1.2. Research Question and Structure of the Thesis

Based on the previous chapter concerning the relevance and motivation for the research topic, the structure of this thesis follows a step-by-step-model of Mayring (2014). The first step contains the development of a concrete research question. The second step involves linking the research question to findings of theory by giving an overview about state-of-the-art insights and theoretical approaches. Urban logistics seems to imply obvious benefits for business and private customers. It enables them to conduct online shopping and receive their ordered goods as quick as possible. However, it is not clearly stated which perceptions and wishes business as well as private customers have concerning urban freight transportation and logistics in general. In today's fast moving and ever-changing world, where automation is at an all-time high and huge global player dominate the delivery market, it is the aim of this thesis to explore the interests of the various customer groups and to discover possibilities and future trends for the urban logistics sector.

For a structured analysis of the smart city topic in general and the urban logistics topic in more detail, the research question is the following:

*How can business and private customers benefit from future urban logistics?*

This research question aims to answer the perceptions on smart cities as well as urban logistics from a detailed point of view by referring to the customer segments of private and business customers. To do this, the theoretical introduction provides the reader with an insight about the notion of smart cities. Furthermore, it is important for the reader to understand what urban logistics is and the different ways it can benefit both private and business customers. Moreover, the targeted customer segments are presented by referring to the business model canvas. The theoretical foundation aims to create a common sense for the depicted topics and to agree upon basic definitions of the used terms. Additionally, it ensures the understanding of the research conducted in the analytical part of this thesis.

The third, fourth and fifth step involves the introduction of the research design and research methodology. This topic is addressed in chapter 3 by presenting the mixed methods research approach as well as the interviews for the business customers and the survey for the private customers to improve comprehensibility for the reader and to ensure a possible replication of the research design by other researchers.

Chapter 4 presents the sixth step, which involves the presentation of the results gained through the interviews and the survey in respect of the research question. To do this, the results are descriptively presented. Moreover, the results are mixed in the form of

a target-aimed discussion and evaluation. Also, the initially posed research question is addressed by referring to the insights and findings gathered through the data inquiry.

The seventh step is presented in chapter 5, which contains the critical appraisal of the thesis. Here, a discussion concerning potential limitations by referring to quality criteria and other relating issues is conducted. Furthermore, recommendations for theory and practice are given and a brief summarizing conclusion of the results gained throughout the thesis is delivered in chapter 6.

The structure of the thesis is represented through Figure 2:

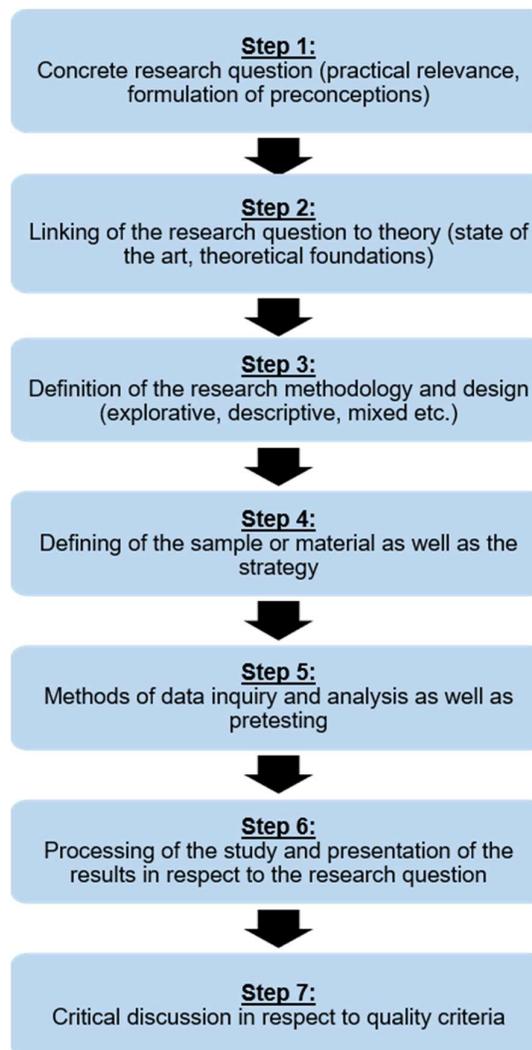


Figure 2: Structure of the Thesis; Source: Own representation based on Mayring (2014)

thesis. This stems from the fact that the interests of the different stakeholder groups of urban logistics and the smart city were examined. The results of this examination lead to the conclusion that logistics service providers should be open for new technologies. Regarding the interests of private as well as business customers, the impression emerges that freight carriers should stress the use of (electric) cargo bikes and basically seek to reduce emissions caused by their delivery vehicles. Also, the bundling of goods in inner-city delivery centers as well as the use of modern algorithm techniques could improve the business models of carriers. In addition to these technical innovations, logistics service providers should strive to use their resources more efficiently. For example, it would be conceivable to share transport vehicles among logistics service providers in order to increase their capacity utilization. Apart from that, it would be possible to bundle deliveries that have to go to similar districts. This would reduce the number of journeys, which would ultimately lead to a better eco-balance for the supplier. These trends have been identified and proposed by both business and private customers and could represent worthwhile business models. In a further step, the identified needs and requirements of these customers should be linked with the other elements within the framework of the business model canvas and checked with regard to their feasibility with various of the trends addressed.

In closing, a number of possibilities that represent promising approaches for the further development of urban logistics service providers were identified and, accordingly, a contribution to the development of their business models was made.

## **6. Conclusions and Outlook**

The smart city concept has guided the transformation of cities into complex systems involving multiple dependencies and interactions. This process involves a growing number of stakeholders from different sectors. Each of these stakeholders has different interests that can contradict each other (Schleicher et al., 2016). In addition to already established logistics companies, startups are offering new solutions for faster or more convenient delivery of orders. Moreover, new technologies push into the markets with the attempt of improving the current delivery situation. This change in urban logistics is influencing and shifting the requirements for transport service providers.

The objective of this thesis was the identification of the requirements and interests of business and private customers in regard to urban logistics and the future of logistics within smart cities in general. Based on the theoretical introduction on smart cities, urban logistics and business models in chapter 2, which was later combined with the understanding and the perceptions of business and private customers, interesting insights have been gained. These insights were presented and brought to a synthesis

in chapter 4 in order to answer the research question: “*How can business and private customers benefit from future urban logistics?*”

To thoroughly answer the research question, interviews with business customers and a survey with private customers were conducted. The interviews were executed following a predeveloped interview guide to extract relevant information. These results were transcribed and analyzed using the method of qualitative content analysis, with the help of the MAXQDA software. The survey was conducted establishing a questionnaire aiming at identifying the most desired features of inner-city delivery and the future of urban logistics. The survey was set up using SurveyMonkey, which enabled the user to easily track the results and create corresponding graphics that visualize the results of the respective questions. In essence, certain characteristics of future urban logistics could be identified that both customer groups have in common.

To answer the research question, the identified elements were divided into four categories. These are quality features, urban logistics trends, behavior of customers and barriers. Quality features describe the most important aspects for business and private customers in the context of deliveries. Future logistics trends represent potential developments in the field of logistics that are considered relevant by both customer groups. Behavior of customers describes the behavior as well as changes in the behavior of both customer groups. Ultimately, barriers were identified that represent potential obstacles that could restrict or interfere further development in the area of urban logistics and smart cities. The respect of the identified interests of the customer groups, especially with regard to logistics service providers, could be used to create new, promising urban logistics business models that benefit both analyzed customer groups. All in all, the discussion demonstrated that the interests of business and private customers largely coincide. Only smaller elements are perceived differently and therefore represent a slightly different preference of the individual customer group.

The information gathered regarding the perceptions and interests of business and private customers have led to a considerable number of questions that may be of potential interest for further research. As mentioned within this thesis, the main goal of urban logistics and smart cities is to improve the quality of life for the inhabitants. When designing new models, the different needs of the stakeholders have to be considered accordingly. In general, there is much scope for future research to better integrate the different customer groups into the development of urban logistics and smart city systems. E-commerce as well as corresponding services such as inner-city transportation are further growing, which makes the continuing development of existing systems necessary in order to reverse the negative aspects and make logistics more customer-friendly. A differentiation of the customer needs is therefore indispensable.