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# Urban Consolidation Centres

## On Relationships between Customer Needs and Services in City Logistics

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**2018**

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Urban Consolidation Centres – On Relationships between Customer Needs and Services in City logistics

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# Abstract

Urban Consolidation Centres (UCCs) are often conceived as an enabler to alleviate negative effects associated with distribution of goods in cities, such as traffic congestion and hazardous emissions. UCCs not only have the potential to reduce these effects but also provide alternative distribution solutions by introducing new transhipment points. Despite their potential, UCCs often fail to be self-supporting and are often dependent on subsides, which is not considered to be sustainable in the long run. In response, this thesis takes its point of departure in the two business models elements value propositions and target customers. A business model is often viewed as an enabler to generate revenue and UCCs have the potential to generate revenue by offering services to their customers, and the customers pay for the services. To understand how customers can benefit from UCCs and provide arguments why they should use these, it is important to understand the relationship between customers' needs and the services UCCs can provide. The purpose of this thesis is to identify and describe the potential relationship between needs of UCC customers and UCC services.

The research in the thesis is both explorative and descriptive, where a first step is to identify customer needs, UCC services, and value propositions. The descriptive part is to describe them and it is also the foundation for understanding the relationship between customer needs and UCC services. Through the analysis and discussion, multiple customer needs are identified and described for seven customer groups and the UCC operator; all of which could be considered customers of UCCs. The thesis also adds to the UCC literature with three new identified UCC services: e-commerce with used products, advertisement, and registration in computer system. The outcome of the analysis also provides illustrations of how customer needs can be matched with UCC services. For the most studied customer group, receiver of goods, a total of 29 different matches were identified, which illustrates the possibilities but also the complexity of the relationships. To understand the relationship, three different types of gaps were also identified that have implications for future research.

The main contributions to research and the UCC literature in particular are enlargement of the scope of customers and the illustration of the relationships between customer needs and UCC services. The illustrations include contributions such as identifying, mapping and describing the customer needs, UCC services, and value propositions. An important first step is to understand how customer needs and UCC services can be linked, and this thesis provides examples of how this can be achieved. Viewing every stakeholder as a potential customer opens up the opportunity to fulfil their needs and the potential to generate revenue, which in turn could close the gap in the problem of non-self-supporting UCCs. Furthermore, with self-supporting UCCs, the number of freight vehicles can be reduced and this may lead to more attractive cities with less traffic congestion and lower emissions.

# Acknowledgements

The process of writing this thesis has been an interesting journey, swinging between having all under control and having a head full of total chaos and self-doubts. Despite everything, the learning outcomes have been tremendous, not only about UCCs but also for myself and what I am capable of. This thesis would, however, not have been possible without the constant support and encouragement I have received throughout the process. I would especially like to extend my sincerest gratitude to a number of people.

First of all, I would like to thank my supervisors Maria Björklund and Martina Berglund. Maria, without your encouragement, feedback, and stimulating discussions this thesis would not have been achievable. You have always pushed me to become a better researcher and you are a great person to look up to in that regard. Thanks too for all the fun trips and laughter; I always enjoy travelling with you. I also look forward to the continuation of our work. Martina, thanks for sharing your expertise in the methodology domains and also for making this thesis readable for others than myself and Maria. It is going to be very exciting to continue to work together with you, but now also in the field.

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Henrik Johansson

December 2017

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Björklund, M. and Johansson, H. (2017). Urban Consolidation Centre: a literature review, categorisation, and a future research agenda. Submitted to a logistics management journal, 3rd stage in the review process.

**Paper II**
Björklund, M., Abrahamsson, M. & Johansson, H. (2017). Critical factors for viable business models for urban consolidation centres, *Research in transportation economics*, 64, 36-47.

**Paper III**
Johansson, H. and Björklund, M. (2017). Urban consolidation centres: retail stores' demands for UCC services, *International Journal of Physical Distribution & Logistics Management*, 47, 646-662.

# Contribution in the appended papers

**Paper I**
The authors contributed equally with research idea, research design, empirical data collection, analysis, and changes during the review process.

**Paper II**
The author of this thesis contributed partly with the empirical data collection, analysis, and changes during the review process.

**Paper III**
The author of this thesis played a large part in the empirical data collection. The authors contributed equally during research design, analysis, and changes during the review process.

# 1 Introduction

*The introduction gives the reader a brief background to the research area, city logistics, and thereafter the focus area; Urban Consolidation Centres (UCCs). Besides describing what a UCC is, two important aspects related to UCCs are presented, the financial aspect and the role of services. The chapter ends by presenting the purpose and research questions of this thesis.*

## 1.1 City logistics on the rise

Due to the on-going environmental degradation, which causes pollution, ecosystem destruction and depletion of the ozone layer (Allen *et al.*, 2015; McKinnon, 2015), awareness has risen on agendas all over the world. The degradation is caused, among other things, by the distribution of goods. Goods distribution has negative effects on air quality, causes accidents and disturbance from noise, and emits hazardous pollutants (Dekker *et al.*, 2012; McKinnon, 2015; Piecyk *et al.*, 2015). In order to cope with these issues the negative effects need to be addressed, especially since the distribution of goods is expected to increase. Moreover, environmental goals from e.g. the European Commission are set to reduce $CO_2$ emissions by 80% by 2050 (European Commission, 2017). *Green logistics* is a term often used to describe environmental effects from activities involved in transport, storage, and management of physical products throughout supply chains, and back again, but also studies how negative environmental effects (e.g. environmental degradation) can be reduced (McKinnon, 2015).

The negative effects caused by the distribution of goods by some type of freight vehicle are also present in urban areas. However, other problems more common in urban areas exist as well. For example, traffic congestion, visual intrusion (Quak *et al.*, 2014; Allen *et al.*, 2015; Nordtømme *et al.*, 2015), and occupancy of kerbside space (Cherrett *et al.*, 2012). Unfortunately, if current trends persist will probably the negative effects be even worse in the future. Firstly, according to a report from the United Nations (2014), almost all population growth is expected to take place in urban areas, which will increase the demand for goods. Secondly, the demand for faster deliveries is increasing, which is pushing the logistics services providers (LSP) to deliver goods faster with smaller vehicles or vehicles that are not fully loaded (Taniguchi *et al.*, 2014; McKinnon, 2015). Both trends will probably result in greater numbers of freight vehicles delivering goods in urban areas. However, even though the freight vehicles in urban areas have several negative effects, they are still a prerequisite for a vibrant, prosperous urban area (see e.g. BESTUFS, 2007; Lindholm, 2010; Allen *et al.*, 2015; Nordtømme *et al.*, 2015).

The trends in the world point to increased demand for goods in cities; there is therefore a need to improve the efficiency and effectiveness of logistics activities in cities. Activities related to the distribution of goods in cities can be congregated under the term city logistics. City logistics is one of the themes into which McKinnon (2015) divides green logistics. As the author also notes, green logistics is undergoing rapid growth due to increased awareness and concerns about the environment. The same thing can be said

about city logistics, where the majority of published articles have been published after 2010 (Lagorio *et al.*, 2016).

While city logistics is indeed on the rise, different descriptions of it exist. One of these was coined by Awasthi and Chauhan (2012), and they define city logistics as:

"*The logistics associated with consolidation, transportation, and distribution of goods in cities is called city logistics. From a systems point of view, city logistics consists of many subsystems involving different stakeholders namely shippers, receivers, end consumers, transport operators and public administrators.*"
(Awasthi & Chauhan, 2012, pg. 6)

Another example is from Taniguchi *et al.* (2001), who explain it as the process of optimizing activities in urban areas with support from advanced information systems (AIS). Closely related to the definition from Awasthi and Chauhan (2012), Lindholm (2012) defines urban freight transport as all movement of goods, service transportation, and demolition traffic into, out from or within urban areas. Worth noting is that Lindholm define urban freight transports, while Awasthi and Chauhan (2012) define city logistics but these descriptions are sometimes seen as equivalent. In this thesis, 'city logistics' is used in the same manner as in the definition by Awasthi and Chauhan, activities associated with logistics management in an urban context.

City logistics cause a number of negative effects but are a necessity. City logistics initiatives aim to reduce the previously mentioned negative effects (Malhene *et al.*, 2012; Quak *et al.*, 2014). Initiatives previously have mostly been regulations instituted by local authorities to prevent LSPs from entering urban areas (Björklund & Gustafsson, 2015). However, freight transportation is a consequence of the demand for goods. City logistics initiatives therefore need to reduce negative environmental and social effects without negatively affecting, for example, economic and administrative activities within cities (Crainic *et al.*, 2009; Benjelloun *et al.*, 2010).

City logistics initiatives can be categorized in different ways. Taniguchi and Van Der Heijden (2000) use the following categories: AIS, cooperative freight transport systems, public terminals, load factor controls, and underground freight transport systems. Muñuzuri *et al.* (2005) call their categorization urban freight solutions that could be applied by local authorities, and the categories are public infrastructure, land use management, access conditions, and traffic management. Even though the categorizations differ, most initiatives can be found in both categorizations. By applying the definition of city logistics from Awasthi and Chauhan (2012), certain categories are more closely related to the definition than others, that is to say categories such as cooperative freight platforms, public terminals, and public infrastructure since they are closely related to consolidation, transportation, and distribution of goods.

In the report "Green paper – Towards a new culture for urban mobility" (European Commission, 2007) it is stated that urban distribution requires some type of interface or decoupling point between regional long-haul transports and distribution within the urban area. The report also notes that smaller and cleaner (more environmentally friendly) vehicles could perform the distribution of goods in cities. BESTUFS (2007) mentions an

urban freight platform as a possible answer to this. With an urban freight platform, the delivery of goods can be handled more efficiently, and the platform has the potential to control the backflow (waste and returns). An example of such a platform highlighted in the report from BESTUFS is Urban Distribution Centre (in this thesis called Urban Consolidation Centre, UCC) which will be the focus in this thesis.

## 1.2 Urban Consolidation Centre – possible answer to the problems

A UCC can be explained as a logistics facility that serves a whole city, or parts of it, and works as an interface between outbound and inbound freight transports. UCC is also one of the most studied city logistics initiatives (Benjelloun & Crainic, 2009; van Rooijen & Quak, 2010; Lagorio *et al.*, 2016). It is also an interesting initiative since it has the potential to reduce negative effects associated with freight distribution, within both the social and environmental dimensions, while also provides an alternative to today's distribution systems (Browne *et al.*, 2005; Nordtømme *et al.*, 2015; Gammelgaard *et al.*, 2016). A terminal solution, like UCCs, is nothing new and most LSPs already use terminals or warehouses. The difference with a UCC is that it manages goods from different LSPs, regardless of if they are competitors or not.

### 1.2.1 Definition of UCC

A commonly used definition of UCCs was coined by Browne *et al.* (2005), who describe it as a logistics facility placed on the outskirts of a city area. At the UCC, goods from different LSPs are consolidated and then distributed to the receivers of goods by a separate operator, e.g. the UCC operator. They also add that UCCs could offer value-added logistics and retail services, such as more flexible delivery times, stockholding at the UCC, and unpacking larger consignments. UCCs can serve an entire city, a part of a city (e.g. shopping malls), or construction sites. Benjelloun and Crainic (2009) note that consolidation takes place at UCCs, and goods from different shippers and LSPs are consolidated. Other definitions of UCC exist as well; Ville *et al.* (2013) use Browne *et al.* (2005) but add that local authorities commonly financier the UCC. van Rooijen and Quak (2010) define it as:

"*Urban consolidation centre include all initiatives that use a facility, in which flows from outside the city are consolidated with the objective to bundle inner-city transportation activities*".

(van Rooijen & Quak, 2010, pg. 5968)

Accordingly, a UCC can be described as some type of building commonly located at the city boundary, that can offer value-added logistics and retail services and that different LSPs drop off their goods there. The goods are then consolidated and thereafter distributed by vehicles originating from the UCC, containing goods from *different* LSPs in the same vehicle delivering to receivers in urban areas. Even if this thesis does not focus on it, other types of system exist as well, e.g. a system with a micro-consolidation centre or mobile logistics facility in urban areas (see e.g. Janjevic *et al.*, 2013). In Figure 1 below, two different scenarios are shown to further distinguish a system with and without a UCC. The system with a UCC is called a UCC system and includes a UCC, transports to the UCC, and transports from the UCC to the receiver of goods.

The receivers of goods are marked as the small teal squares within the city area and the LSPs are the larger teal rectangles. The styles of the lines in the first scenario represent each LSP's route. In the second scenario, the dotted line represents the route of the UCC operator.

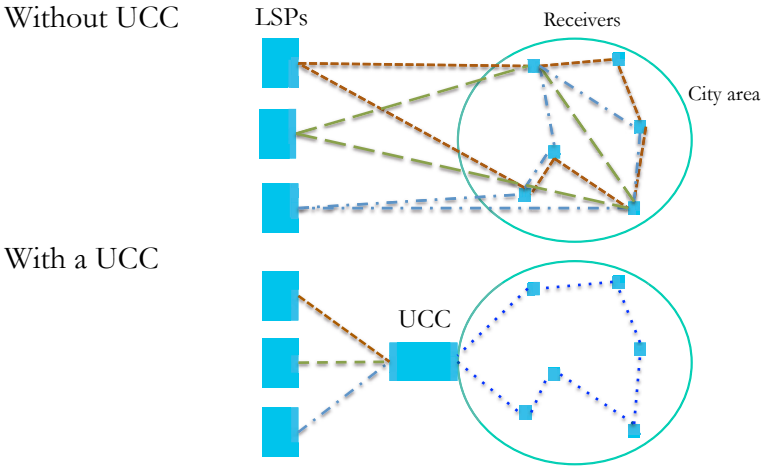



**Figure 1. Two different scenarios, one with a UCC and one without**

UCCs can provide several benefits for different stakeholders. For example from the figure above, the number of freight vehicles can be reduced in a system with a UCC which can result in a more attractive city area. This can also have positive effects on LSPs and receivers in the urban area. However, they can also be affected negatively by it. The LSPs lose for example their customer contact and the total product delivery time can increase for receivers. Despite this, this thesis strives to provide a basis for understanding how different stakeholders can benefit from the use of UCCs, and only the benefits will therefore be studied in this thesis.

### 1.2.2 Benefits and UCC services

The benefits UCCs can provide can be divided into two parts: how they can reduce the negative effects from distribution of goods and other benefits aimed at different stakeholders. Firstly, by consolidating goods close to the city, a high load factor on the freight vehicles entering the city can be achieved that in turn can reduce the number of freight vehicles needed (Browne *et al.*, 2005; van Rooijen & Quak, 2010; Gammelgaard *et al.*, 2016). With fewer freight vehicles, negative environmental and social effects caused by them can be reduced. Also, UCCs enable a change to smaller, more environmentally friendly vehicles, due to shorter delivery distances (Browne *et al.*, 2005; van Rooijen & Quak, 2010; Lebeau *et al.*, 2013), and Lin *et* al. (2016) also note that energy consumption can be reduced. The other part of the benefits is dependent on the stakeholder. For example, receiver of goods (e.g. retail stores) can benefit from the use of value-added services (see e.g. van Rooijen & Quak, 2010; Aastrup *et al.*, 2012) but also from logistics services such as potential to influence on the delivery time (see e.g. Browne *et al.*, 2005). Furthermore, LSPs can save time by not entering the urban areas and instead drop off their goods at UCCs (Browne *et al.*, 2007). The citizens and local authorities can benefit

from attaining a more attractive city, e.g. with fewer freight vehicles (Browne *et al.*, 2007; Nordtømme *et al.*, 2015).

In the studied UCC literature, different terms are used to describe the services UCCs can offer. For example, Browne *et al.* (2005) call them value-added logistics and retail services, van Rooijen and Quak (2010) call them extra services, and Aastrup *et al.* (2012) use the term 3PL services. To avoid ambiguities, the term **UCC services** will accordingly be used in this thesis to describe all possible services, including consolidation.

### 1.2.3 Financial aspect of UCCs

In the past, UCCs have often been funded by local authorities or funding agencies. However, previous research and pilot trials have shown that when the subsidy ends the UCC is often shut down because revenues does not cover the costs associated with it (Browne *et al.*, 2005; van Rooijen & Quak, 2010; Allen *et al.*, 2012; Ville *et al.*, 2013; Quak *et al.*, 2014). The financial aspect is one of the more recognized problems with UCCs. UCCs cost money, in terms of start-up cost (e.g. cost of land and buildings) and operational cost (e.g. cost of personal, vehicles, rent) (Browne *et al.*, 2005; Nordtømme *et al.*, 2015; Lin *et al.*, 2016). In other words, UCCs often fail to be financially viable. Browne *et al.* (2007) describe 'financially viable' as:

*"The general consensus is that UCCs must be financially viable in their own right in the medium- to long-term and that subsidies are not a desirable solution."*

(Browne et al., 2007, pg. 58)

From a UCC perspective, financial viability can be achieved when revenues to the UCC cover the costs associated with it. The financial aspect of a UCC is often viewed as a major challenge. In response, several authors argue that UCCs have the opportunity to generate revenue by offering different services to different stakeholders, and the UCC services can thereby be an important enabler for generating revenue (Browne *et al.*, 2005; van Rooijen & Quak, 2010; Aastrup *et al.*, 2012; Allen *et al.*, 2012). To increase the understanding of the financial aspect and how to generate revenue, a number of authors point to the need to use a well thought-out business model when designing UCCs (Browne *et al.*, 2005; Allen *et al.*, 2012; Malhene *et al.*, 2012; Quak *et al.*, 2014; Nordtømme *et al.*, 2015). A well though-out business model is a good starting point for any business to generate revenue, and in this context, a UCC can be viewed as a business. Like businesses, UCCs consists of some type of organisation with, for example, the goal of selling services.

### 1.2.4 Business models and UCCs

One definition of a business model is described by Afuah (2004), who points to the importance of generating money:

*"A business model is a framework for making money. It is the set of activities which a firm performs, how it performs them and when it performs them so as to offer its customers benefits they want and to earn profit."*

(Afuah, 2004, pg. 2)

Another definition, put forward by Osterwalder *et al.* (2005) has some similarities to Afuah's, but they point out that a business model is related to the value a firm or

organisation offers to its customers and also creates sustainable revenue streams. They also describe a business model as: *"… for business model, the quest is to identify the elements and relationships that describe the business a company does"* Osterwalder et al., 2005, pg. 5). The authors also note that it is not the separate elements making up a business model that decide its success, rather the whole, the relationship between elements, and that every element is considered (Osterwalder et al., 2005). These elements, according to Osterwalder et al. (2005), are: value propositions, target customer, distribution channels, relationships, value configurations, core competency, partner networks, cost structure, and revenue model.

Furthermore, when discussing services, it is also important to address to whom they are directed. In this thesis, all stakeholders that can be positively affected by UCCs are viewed as potential customers, in this thesis termed **UCC customers** (further elaborated on in chapter 2). Browne *et al.* (2007) note, however, that the net benefit is unclear. Despite this, as a first step this thesis will only focus on potential benefits for different UCC customers and not some type of net outcome. From a business model perspective, TURBLOG (2011) states that in order to provide value to customers, it is important to solve a problem, satisfy their needs, or identify their wishes. In other words, providing services that customers find some type of benefit in can fulfil a **customer need** (see e.g. van Rooijen & Quak, 2010; Aastrup *et al.*, 2012). Worth noting is that this thesis only focuses on customer needs that a UCC can fulfil.

Value proposition is one element of a business model and one of the elements on which this thesis focuses. Since **value propositions** can be described as the value that can be provided for customers (Osterwalder & Pigneur, 2010), and it is closely related to services and the potential to generate revenue. Value propositions and revenue are closely related and also intertwined; consequently, in this thesis revenue will not be studied explicitly but rather viewed as a potential consequence of offering value propositions to the customers. Target customer is another element that is in focus. However, close relations also exist to other elements such as revenue model, value configuration, and partner network. It is not surprising that other elements are closely related, because as Osterwalder *et al.* (2005) note, it is the whole that decides the success of a business model and that all elements are considered. To study, for example, value propositions other elements in a business model are affected. This thesis, however, strives to provide a first step towards more financially viable UCCs and thereby focuses on two elements. Since services, value propositions, and customers are closely related to the financial aspect (see e.g. van Rooijen & Quak, 2010; Allen *et al.*, 2012), these parts of a business model will be in focus.

## 1.3 Purpose and research questions

Previous research has pointed out that the financial aspect of UCCs is often seen as a major barrier to long-lived UCCs. Furthermore, UCC services and value propositions seem to be enablers to generate revenue. However, knowledge gaps exist, both between how UCC services and value propositions can be related, but more importantly the relationship between what potential UCC customer needs and what a UCC can offer. This thesis therefore strives to provide a better understanding of how the relationships between customers' needs and UCC services can look, however, not a comprehensive

picture of all customer needs, value propositions and their relationships. If these can be matched, a greater possibility arises for the potential customers to be UCC customers and thereby pay for UCC services, i.e. a basis for financially viable UCCs. This leads to the purpose of this thesis:

**The purpose of this thesis is to identify and describe the potential relationship between needs of UCC customers and UCC services.**

To be able to fulfil the purpose, three research questions are posited. First of all, it is important to identify and describe the potential needs of UCC customers. In order to understand the relationships, it is important to consider what potential needs UCC customers can have (that a UCC can fulfil). The first research question is formulated as:

*RQ1: What needs can UCC customers have?*

It is not only of interest to identify and describe what potential customer needs exist, but also to take the perspective of UCCs and explore what they can provide for their customers. Services are an important part when discussing the financial aspect. Furthermore, the relationships between UCC services and value propositions is also important since potential customers of UCCs are probably interested in what benefits a value proposition can lead to. This leads to the second research question:

*RQ2: What services can UCCs provide and what value propositions can they lead to?*

Between customers' needs and what UCCs can offer, a number of gaps and matches probably exist. In order to understand the relationships between customer needs and value propositions, these matches need to be addressed. By identifying these matches, and in turn identifying what benefits the customers can obtain, arguments can be provided for why or why not the customers could be interested in using UCCs (and thereby pay). The third research question is formulated as:

*RQ3: How can UCCs' value propositions match needs of UCC customers?*

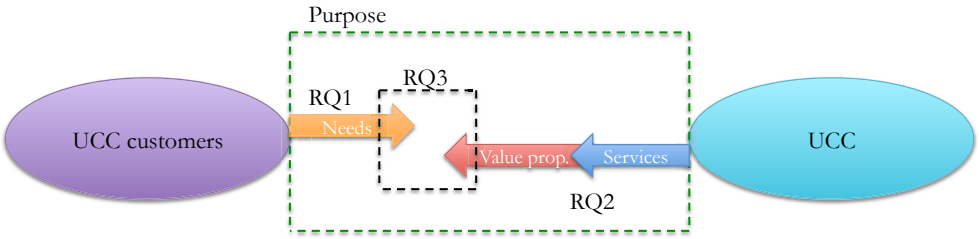



**Figure 2. Perspective of the research questions**

Figure 2 above illustrates the perspective of the three research questions and the purpose. Research question one explores the potential customer needs. Number two explores what UCCs can provide, both in terms of UCC services and value propositions. Research question three addresses the matches in the relationships between value propositions and

customer needs. Research questions one and two can be seen as parallel, while the third combines the two.

## 1.4 Outline of the thesis

Chapter 2, the frame of reference, presents the literature used in the thesis. The chapter introduces four important concepts used in the research questions: UCC customers, customer needs, UCC services, and value propositions.

Chapter 3 presents the methodology used in the thesis. The research approach is presented first with a description of the approach of formulating the purpose and research questions. The next paragraph is the research process, which is divided into five different parts: initial literature review, studies A through C, and the method for the final analysis. The chapter ends with a discussion regarding trustworthiness and reflection on methodology.

Chapter 4 summarizes the appended papers and illustrates how the different papers contribute to the analysis. The chapter follows the same structure for the all three papers. The papers are first summarised, followed by how they contribute to the analysis.

Chapter 5, the analysis and discussion, presents the analysis of the three research questions and combines them to fulfil the purpose. The chapter contains the findings from the papers used together with the literature from the frame of reference.

The last chapter, Chapter 6, presents the conclusion of the thesis. The chapter includes conclusions based on the analysis and discussion, contributions to both research and practice, and ends with reflections on future research.

# 2 Frame of Reference

*In this chapter, the focus will be on four important concepts from the research questions; UCC customers, customer needs, UCC services, and value propositions. Within all parts, a general description is first provided, followed by the concept in a UCC context.*

## 2.1 UCC customers

From the business model canvas proposed by Osterwalder *et al.* (2005), one element is target customer, and it is described as *"the segments of customers a company wants to offer value to*" (Osterwalder *et al.*, 2005, pg. 18). Osterwalder and Pigneur (2010) also mention customer gains, and describe these as the outcomes and benefits the customers request or need. In other words, a customer to an organisation is someone who receives some type of value. Similar canvases have also been used in a city logistics context by e.g. TURBLOG (2011), who also have customer segments as one element. They describe this element as "for whom is the organisation creating value" and also who the group of people are that an organisation wants to reach out to.

In the UCC literature, customers of UCCs mostly address the receiver of goods (see e.g. Browne *et al.*, 2007; van Rooijen & Quak, 2010; Aastrup *et al.*, 2012). However, when considering benefits from the use of UCCs, Browne *et al.* (2005) and Browne *et al.* (2007) list multiple benefits for multiple stakeholders. Moreover, Allen *et al.* (2012) note that different stakeholders should contribute to the financing of UCCs. Along the same lines, Marcucci and Danielis (2007) state that when considering costs and benefits, it is important to consider both private and social stakeholders. From the more general business model literature, a customer is someone to whom an organisation offers value; this can be likened to benefits UCCs can provide for different stakeholders (see e.g. the list from Browne *et al.*, 2005). All stakeholders within city logistics can thus be considered potential customers of UCCs.

It is also worth noting that the term *stakeholder* is from a city logistics perspective. Ballantyne *et al.* (2013) provide a holistic view of different stakeholders but make a distinction between actors and stakeholders. An actor is a group that has a direct influence on city logistics, while stakeholders rather indirectly influence city logistics. Since (in this thesis) a potential customer of UCCs can be anyone who can be positively affected by a UCC, there is no need to distinguish between actor and stakeholder (from Ballantyne *et al.*, 2013). Instead, these two descriptions from Ballantyne *et al.* (2013) are combined, which leads to the following definition: stakeholders are all those who have an interest in the system of city logistics (individuals, groups of people, organisations, companies, etc.) and also those who have a direct influence on the system. The relation between stakeholders and potential customer of UCCs is illustrated in Figure 3 below. For example, authorities can be positively affected by UCCs through a more attractive city area with fewer freight vehicles (Browne *et al.*, 2005), while logistics services providers

can be positively affected by saving delivery time through avoiding inefficient last mile deliveries (Gonzalez-Feliu *et al.*, 2014).

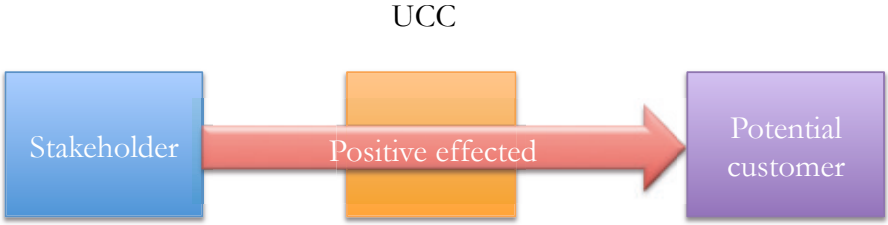



**Figure 3. If a stakeholder can be positively affected by UCCs, they can be viewed as potential customers of UCCs**

Within a city logistics context, a number of stakeholders exist. From their definition of city logistics, Awasthi and Chauhan (2012) mention five stakeholders: suppliers, the ones that supply the goods; receivers, receive the goods; end customer, the final user of the goods, e.g. the residents of an urban area; transport operators, the carriers of the goods; and public administrators, both government and transport authorities. Quak and Tavasszy (2011) divide stakeholders into four main groups, receivers, transport providers, local authorities, and residents. However, the authors also note that national government, shippers (transport goods to the receivers), and shoppers have an interest in urban areas. The stakeholder 'transport provider' can have a different meaning when UCCs are present. Browne *et al.* (2005) have transport provider (TP) as a stakeholder, but in this case the TP is responsible for deliveries between suppliers and UCCs. This can be compared to, for example, Muñoz-Villamizar *et al.* (2014), who optimize routes only within urban areas and vehicles originating from a UCC. To be able to keep them apart, the term 'transport provider' will be used to describe the stakeholder responsible for deliveries between supplier and UCCs. Urban transport provider (UTP) will be used to describe the stakeholder responsible for deliveries between UCCs and receivers in the urban area. Worth noting is that the UCC operator is commonly viewed as responsible for these deliveries (see e.g. Browne *et al.*, 2005), but this does not always have to be the case (see e.g. Björklund & Gustafsson, 2015). Lastly, in a UCC context, Browne *et al.* (2005) add UCC operator as a potential stakeholder.

Different authors mention authorities; Awasthi and Chauhan (2012) have government and public transport authorities, and Quak and Tavasszy (2011) and Browne *et al.* (2005) have local authorities. The term *authorities* will be used to include authorities on both the local and national level. It is important to include both types of authority since local authorities have the ability to introduce local regulations, while new laws can be introduced on a national level. In the model from Ballantyne *et al.* (2013) trade associations, commercial organisations, and property owner are mentioned.

From the discussion above, Table 1 below illustrates identified potential UCC customers. The table presents the terminology used in the thesis together with the definition and comments if needed.

**Table 1. The terminology and definition of potential UCC customers**

| Terminology of potential customer of UCCs | Definition | Comment |
|---|---|---|
| Supplier | The sender of goods | |
| Receiver | The receiver of goods | Receivers within urban areas |
| Transport provider* | The carrier of goods | Often between suppliers and receivers or UCCs |
| Urban transport provider* | The carrier of goods from UCCs to receivers in urban areas | |
| Authorities | At a local or national level, have the ability to introduce new laws and regulations | |
| Residents | The inhabitant in urban areas | Also including visitors such as shoppers |
| UCC operator* | Responsible for the daily operation of UCCs | |
| Property owner | Owner of property within urban areas | |

*The previously used term *logistics service provider* is replaced by the following stakeholders: transport provider, urban transport provider, and UCC operator. In a UCC system, these stakeholders handle the work performed by logistics service providers.

To conclude this section, multiple stakeholders exist and if they can be positively affected by UCCs, they can also be viewed as UCC customers. The following sections within this chapter are based on the customer groups listed above in Table 1.

## 2.2 Needs of UCC customers

From their business model canvas, TURBLOG (2011) state that, in order to provide the customers with some type of value, it is important to solve a problem, satisfy their needs and identify their wishes. However, when addressing needs or "to solve problems" in a UCC context, these terms are seldom used. One reason might be that the perspective of potential customers of a UCC is seldom taken. For example, van Rooijen and Quak (2010) note that the perspective of the receivers is seldom taken even though they might benefit the most from a UCC. Aastrup *et al.* (2012) and Gammelgaard *et al.* (2016) share this view. They even state *"The user´s perspective in city logistics research is limited, and value added services are rarely emphasized."* (Gammelgaard *et al.*, 2016, pg. 787). However, it is not only the perspective of the receivers that is not fully researched; most of the value creation within city logistics is not properly researched (Gammelgaard *et al.*, 2016).

As noted, in the studied UCC literature is the term customer needs seldom used and another approach is therefore used. From the business model literature, Osterwalder *et al.* (2005) note the importance of considering what value is provided to the customers. Fulfilling a need can provide value, but also if customers experience problems with

something and UCCs can solve it. This is along the same lines as TURBLOG (2011) above, that it is important to solve a problem or satisfy customers' needs. Thus, potential customer needs can be identified by recognizing the interest of the customers. In the case that the interests are not fulfilled, fulfilment of them can be viewed as a need. Also, TURBLOG (2011) note the importance of solving a problem for customers, customer needs are thereby identified by recognizing problems of UCC customers. In other words, customer needs can be interest of UCC customers and problems they experience (that a UCC can fulfil).

The interests of potential UCC customers take the point of departure in the potential customers listed in Table 1 above. The suppliers' interests are for example profitability, cost efficiency, and an adequate distribution system (OECD, 2003). Quak and Tavasszy (2011) add efficient distribution at low cost as one of their interests. Receivers, such as retail stores, are interested in profitability, attractive workspace, reliable transports, and an attractive shopping environment (OECD, 2003; Quak & Tavasszy, 2011). Furthermore, Aastrup *et al.* (2012) also mention that receivers', in their case retail stores', role is to provide service through sales to end customers. The interests of TPs include cost efficiency, sufficient distribution system, and attractive workplace (OECD, 2003; Quak & Tavasszy, 2011). Both authorities and residents of urban areas demand and expect an attractive city, good availability of goods, having access to parking spaces, and not being bothered by freight vehicles (OECD, 2003). This is in line with both Ballantyne *et al.* (2013) and Quak and Tavasszy (2011), who state that authorities and residents interests are attractive urban areas with clean air and no disturbances from freight vehicles. Moreover, authorities are also responsible for sustainable development of cities (Awasthi & Chauhan, 2012). UCC operators and property owners are interested in profitability (Browne *et al.*, 2005).

In one of the few identified articles that investigate the needs of receivers of goods in a UCC system, Aastrup *et al.* (2012) note that interest in UCC services was generally low. But when they instead investigated what problems the receiver of goods had they found that delivery times were unreliable, which leads to store personnel being disturbed. Another problem was inventory management; the records were not accurate and both led to lower service to their customers. In a case from Gammelgaard *et al.* (2016), they identified the delivery time, delivery frequency and delivery size as a major problem for receivers, in their case retailers. By applying the definition of needs above, these problems for receivers can be translated into needs.

Also, Björklund and Martinsen (2014) investigated what problems three different stakeholders experienced in a Swedish city. First of all, the local authority found it problematic that freight vehicles unloaded their goods on narrow streets, which caused traffic congestion and blocked parking spaces. The local authority also considered the deliveries occurred during the whole day to be a negative aspect since it decreased the safety of pedestrians, i.e. residents, shoppers, and visitors.

From the perspective of TPs, Björklund and Martinsen (2014) identified problems such as unavailability of unloading sites and inefficient unloading procedures at malls, where they had to deliver to each store through the entrance. The third stakeholder, property owners,

was unhappy with freight vehicles parked outside their stores, which decreased the attractiveness of the area.

To conclude this section, two alternative synonyms are used to identify customer needs mainly from the studied UCC literature. Interests of UCC customers that are not fulfilled are viewed as needs. And by applying the definition of customer needs, the problems that Aastrup *et al.* (2012), Gammelgaard *et al.* (2016), and Björklund and Martinsen (2014) identified can also be considered needs.

## 2.3 UCC services

There are several ways to define a service (see e.g. Vargo & Lusch, 2004; Edvardsson, 2005; Russell & Taylor, 2014). This thesis, however, uses the definition from Russell and Taylor (2014) and their characteristics of services. They describe services as *"Services are acts, deeds, performances or relationships that produce time, place, form, or psychological utilities for customers.*" (Russell & Taylor, 2014, pg. 148) Moreover, similar to service characteristics from Ellram *et al.* (2007) and Lovelock (1983), Russell and Taylor (2014) propose eight characteristics of a service. They are:

1. Services are intangible
2. Service output is variable
3. Services have higher customer contact
4. Services are perishable
5. The service and service delivery are inseparable
6. Services tend to be decentralized and geographically dispersed
7. Services are consumed more often than products
8. Services can be easily emulated

From the UCCs' point of view, UCC services match a number of the characteristics. First of all, UCC services are intangible since they cannot be seen and could have different meanings for different customers (for example different benefits for different UCC customers, see e.g. Browne *et al.*, 2005). UCC service output varies; different customers have different needs, which leads to the same service perhaps having different outputs (again, this can be compared to different benefits for different UCC customers, see e.g. Browne *et al.*, 2005). UCC services tend to have higher customer contact; in order to understand and also fulfil the needs of the customers, interaction may be needed (different UCC customers have different needs, i.e. need to understand UCC customers situation, see e.g. Aastrup *et al.,* 2012 or Browne *et al.,* 2005). UCC services are perishable since they cannot be stored (none of the services suggested in e.g. Aastrup et al., 2012 can be stored. UCC services and their delivery are inseparable; in the case of nightly deliveries (Paddeu, 2017), for example, the service and delivery cannot be separated. UCC services may tend to be decentralized and geographically dispersed; the characteristics of cities may differ and also the needs of potential customers (see e.g. Browne *et al.*, 2005). The second to last characteristic is not applicable to UCC services since UCCs do not offer products. UCC services can be emulated; most of the services presented in Table 2 below are not only applicable in a UCC context, but also to city logistics in general, e.g. nightly deliveries (see for example Holguín-Veras *et al.*, 2011).

The term UCC services include all possible services that UCCs can provide, regardless the customer. In the UCC literature, a number of different UCC services have been described. These are presented in Table 2 below. The idea is that most of these UCC services are something that the customer can choose and thus also pay for (Browne *et al.*, 2005; van Rooijen & Quak, 2010; Allen *et al.*, 2014). Allen *et al.* (2012) state for example that retailers have the potential to choose the service or services that they prefer.

**Table 2. Different UCC services with a description and related references**

| UCC service | Description | References |
|---|---|---|
| Nightly deliveries | By placing UCCs outside urban areas, or at the boarder, nightly deliveries can be possible | Browne *et al.* (2005), Aastrup *et al.* (2012) |
| Off-peak deliveries | In the same manner as nightly deliveries, off-peak deliveries may be possible. This is especially applicable if the city the UCC serves uses delivery time windows | Browne *et al.* (2005), Aastrup *et al.* (2012) |
| Request delivery time | The receivers can have the opportunity to select preferred delivery time | Browne *et al.* (2005), Aastrup *et al.* (2012) |
| Request delivery frequency | The receivers can have the opportunity to select preferred delivery frequency | Browne *et al.* (2005), Aastrup *et al.* (2012) |
| Stockholding at UCCs | Since a UCC is some type of terminal, it can offer storage of goods. The receivers can use the storage as permanent storage, storage during peak periods (e.g. Christmas) or an off-site buffer | Browne *et al.* (2005), Aastrup *et al.* (2012), BESTUFS (2007), Cherrett *et al.* (2012), Malhene *et al.* (2012) |
| Use of environmentally friendly vehicles | Due to shorter delivery routes, UCCs can offer a change to vehicles that are more environmentally friendly as regards both size and fuel | Browne *et al.* (2005), Lebeau *et al.* (2013), van Rooijen and Quak (2010), Browne *et al.* (2011) |
| Pre-retail services | UCCs can offer multiple pre-retail services to the receivers. For example, price tagging of products, attaching anti-theft devices, preparation for store displays, unpacking larger consignments, customizing products to local standards, and filling shelves at the receiver's premises | Browne *et al.* (2005), Aastrup *et al.* (2012), Allen *et al.* (2014), Nordtømme *et al.* (2015), Malhene *et al.* (2012) |
| Ordering process | UCCs can take over the task of ordering new of new products from e.g. retail stores | Browne *et al.* (2005), Aastrup *et al.* (2012) |
| End customers can collect goods at UCCs | Since most of the deliveries to receivers pass through UCCs, it can function as a pickup point, where end customers collect their goods, instead of at the store. UCCs could also offer some type of delivery boxes where end consumer can collect their deliveries themselves | BESTUFS (2007), Allen *et al.* (2014), Österle *et al.* (2015), Malhene *et al.* (2012) |

| | | |
|---|---|---|
| Waste and return management | Along the delivery routes, the driver can also offer waste and return collection from the receivers | van Rooijen and Quak (2010), Aastrup *et al.* (2012), Allen *et al.* (2014) |
| Home deliveries | The UCC operator might also offer home deliveries to the end consumers | van Rooijen and Quak (2010), Malhene *et al.* (2012) |
| Quality and quantity check | Before distribution, both a quality and quantity check can be made of the products. | BESTUFS (2007) |
| Charging stations | If UCCs use electric vehicles and have charging stations, the charging stations can also be offered to other users | Lin *et al.* (2016) |

To conclude, the UCC services listed in Table 2 above are the identified ones, and in most cases lack a clear connection to different customer groups. This connection can be deemed a value proposition, presented in more detail in the following section.

## 2.4 Value proposition from UCCs

From the business model canvas, proposed by Osterwalder *et al.* (2005) and also used by Osterwalder and Pigneur (2010), one of the elements is value proposition. Osterwalder and Pigneur describe this as propositions from an organisation targeting its customers, in order to create customer value by addressing some type of problem or need. From the same canvas, Osterwalder and Pigneur (2010) also include the following four questions when describing value propositions: *What value do we deliver to the customer? What problems are we helping to solve? Which customer needs are we satisfying?* and *What bundles of products and services are we offering to each customer segment?*

From a city perspective, TURBLOG (2011) have adopted the canvas from Osterwalder *et al.* (2005) and apply it in different cases. Common value propositions were improved performance/efficiency, cost reduction, and improved reliability. These fit with the description from Osterwalder and Pigneur (2010), either what value is offered or what problems or needs does it help to solve.

Both Osterwalder and Pigneur (2010) and TURBLOG (2011) use the term *service* when describing value propositions. However, to avoid ambiguities with UCC services, value propositions are used more in line with the three questions that describe a value proposition (*What value do we deliver to the customer? What problems are we helping to solve? Which customer needs are we satisfying?).*

To conclude, from a UCC perspective, value propositions from UCCs can be described as value from UCC services aimed at its customers. Value propositions for each of the potential customers of UCCs are presented below.

**Value propositions for suppliers**
With better transparency throughout the supply chain, suppliers can receive more information about the goods flow and use it to improve their planning (Browne *et al.*, 2005; BESTUFS, 2007). Shorter delivery times for TPs, due to delivery to UCC instead of multiple receivers, can reduce the delivery cost, which in turn can save money for the suppliers who often buy the transports (Browne *et al.*, 2005).

**Value propositions for receivers**
As van Rooijen and Quak (2010) state, the receivers of goods could benefit the most from the use of UCCs. They can thus be the customers that have the greatest interest in UCC services. First of all, with the transhipment point much closer (in general) to the recipients of goods, the delivery punctuality can increase (Browne *et al.*, 2005; Aastrup *et al.*, 2012). Furthermore, Aastrup *et al.* (2012) state that the receivers can have more influence on the time of delivery and delivery frequency, i.e. an opportunity to chose. Better delivery reliability and having the potential to influence delivery time and frequency can improve the receiver's working environment. Both Aastrup *et al.* (2012) and Browne *et al.* (2005) note that the receiver can be less disturbed by the deliveries, which in turn could grant them more time to provide service to their customers. Also, by knowing more exactly the time of delivery, manning the personnel at receivers according to the amount of deliveries can be improved (Browne *et al.*, 2005; Aastrup *et al.*, 2012). Furthermore, UCCs can provide better transparency in the supply chain, which can further improve receivers' planning (Browne *et al.*, 2005; BESTUFS, 2007).

One of the services UCCs can offer is stockholding, and the receivers can benefit from using storage at a UCC by moving some, or all, of their storage to free up space which could for example be used to increase the sales area (Aastrup *et al.*, 2012). Lin *et al.* (2016) argue that the rent is often higher at the receivers' premises than at UCCs, and receivers can therefore save money by relocating their storage. Another benefit, in the case of retail stores, is that they can increase their product range by reducing the stock levels at the stores, which in turn can attract more customers (Aastrup *et al.*, 2012). Also, Browne *et al.* (2005) and Aastrup *et al.* (2012) argue that the storage at UCCs can be used during peak periods (e.g. Christmas), and thereby more easily match the demand, and avoid out of stock situations. Pre-retail services can further free up time for the personnel and can lead to better staff planning (Browne *et al.*, 2005; Aastrup *et al.*, 2012). Both have the potential to result in more time being available for the personnel and reduce stress, and potential to save money. If UCCs can offer Unpacking of large consignments and placing goods directly on shelves can also give the retail stores' customers a better perception of the stores (Aastrup *et al.*, 2012). Another benefit, mentioned by Gammelgaard *et al.* (2016) is perceived security by meeting the same driver every time. Lastly, receivers can attract new customers by offering e-commerce through UCCs, i.e. the UCC can function as a delivery point (BESTUFS, 2007; Allen *et al.*, 2014).

**Value propositions for transport providers**
According to Gonzalez-Feliu *et al.* (2014), TPs can improve their efficiency by not having to enter urban areas with narrow streets and pedestrian areas. Along the same lines, Allen *et al.* (2012) and Browne *et al.* (2005) also mention that TPs can save both time and money by dropping off the goods at UCCs instead of entering congested cities. Furthermore, in

cities with time windows (see e.g. Quak & Tavasszy, 2011), TPs can deliver their goods during the whole day (in cases where UCCs are located outside the time window zones), which can make their planning easier and save money (Browne *et al.*, 2007). Their planning can also be improved through increased transparency throughout the supply chain with more reliable information on, for example, orders (Browne *et al.*, 2005; BESTUFS, 2007).

**Value propositions for urban transport providers**
In the same way as UCC operators attain an operation when UCCs are set up, the same thing can be said about urban transport providers (UTPs). In other words, the UTPs obtain new markets and can thereby make a profit. However, a UCC located close to the urban area is a prerequisite for a UTP to be present. The UCC operator can be responsible for the deliveries in urban areas (see e.g. Browne *et al.*, 2005), but the deliveries can also be outsourced. One example can be seen in Björklund and Gustafsson (2015), where the municipality owns the UCC and a UTP is responsible for the deliveries in the urban area.

**Value propositions for authorities**
One of the fundamental value propositions UCCs can offer is the potential to reduce the number of freight vehicles in urban areas (Browne *et al.*, 2005; BESTUFS, 2007; Aastrup *et al.*, 2012). Authorities can benefit from a more attractive city with, for example, less traffic congestion, lower emissions, and smaller freight vehicles. Björklund and Gustafsson (2015) also argue that receivers can benefit through a safer work environment, e.g. less traffic around schools and retail stores. Local authorities can also make profit from a UCC licensing fee (Browne *et al.*, 2005).

**Value propositions for residents**
The value propositions to the residents are similar to those for authorities: a more attractive and safer city (fewer traffic-related accidents) with fewer freight vehicles (Browne *et al.*, 2005; BESTUFS, 2007; Aastrup *et al.*, 2012; Björklund & Gustafsson, 2015).

**Value propositions for UCC operators**
If private companies operate UCCs, they have the potential to make profit by offering UCC services to customers and the customer paying for these (Browne *et al.*, 2005).

**Value propositions for property owners**
Property owners can benefit from attaining a more attractive area with fewer freight vehicles (Browne *et al.*, 2005).

To conclude, value propositions can be viewed as direct or indirect effects from using UCCs. One example of direct and indirect effects is from the customer group transport providers; a direct value proposition for them is that they do not have to enter urban areas while an indirect one is that they can save delivery time.

# 3 Methodology

*This chapter presents the methodology used in the thesis. As a first step, the approach of deciding the purpose is presented, followed by the research process. The process consists of five parts: an initial literature review, three studies, and the method for the final analysis. Within all the parts the selection, data collection, and data analysis are described and motivated. The chapter ends with a discussion about trustworthiness and reflection on methodology.*

## 3.1 Research approach

The purpose of this thesis is *to identify and describe the potential relationship between needs of UCC customers and UCC services*. The thesis addresses the knowledge gap between UCC services and the needs of UCC customers. Matches between services and customer needs can result in willingness for UCC customers to pay for the UCC services, which in turn could strengthen the financial aspect of UCCs. Previous research in the field of UCCs often singled out the lack of financial viability of UCCs as a major barrier to successful, long-lived UCCs; they fail to generate enough revenue to cover their own costs. An explorative approach is used in order to fulfil the purpose since the knowledge gap between what UCCs can offer and UCC customers' needs is often mentioned but rarely studied (see e.g. Browne *et al.*, 2007; Gammelgaard *et al.*, 2016). It is common to use an explorative approach when the goal is to describe a certain problem (Arbnor & Bjerke, 1994). Firstly, the literature related to UCCs often mentions that UCCs can offer services and value propositions to different stakeholders. The value propositions, however, are often briefly mentioned and not explored in detail. An important first step towards fulfilling the purpose is to explore what the needs of UCC customers are. As an explorative approach is used when the objective is to provide knowledge within a problem area and also shed light on the problem from different angles (Patel & Davidson, 2011), it was chosen as the starting point. Secondly, the literature often refers to value propositions and services as enablers for generating revenue. It was thereby also important to explore how offered value propositions and services can be matched to what the customers needs or requests. Potentially, matches and gaps exist between what is offered and what is needed and in order to shed light on these matches and gaps, an explorative approach can be used.

Throughout the research, different approaches have been used, which in some cases could be described as inductive (generating theories from empirical findings, Arbnor & Bjerke, 1994, and Bryman & Bell, 2015) and deductive (depart from literature and generate theories, Bryman & Bell, 2015). For instance, when value propositions and UCC services were studied, the point of departure was the UCC literature; for example what services have been identified and descried. When investigating needs of UCC customers, the point of departure was the empirical data, mainly collected through interviews.

## 3.2 Research process

The research process consists of five different parts: an initial literature review, three studies, and the final analysis. The research process began in September 2015. The frame for the research was already set as this thesis is part of a larger research project called Business models for city logistics. Even though the frame was set, the first task was to identify the focus area within the frame. In order to propose a purpose and research questions, a deeper understanding of city logistics and business models was needed. To accomplish this, an initial scan was performed of the literature in both areas.

Three separate studies were conducted during the research process. The first study (Study A) was a systematic literature review of all journal articles that focus on UCCs, i.e. have UCC or synonyms in either the title, the abstract or the key words. The objective of the study was to identify all journal articles that have been published. Study number two (Study B) was an interview study conducted on existing UCCs in Europe. The objective of the study was to describe to what degree different UCCs use a business model and what elements of the business model are viewed as most critical. Contrary to study two, which investigates UCCs from a holistic perspective, the last study (Study C) focused on a particular potential UCC customer type: retail stores and their potential needs. The purpose of this study was to investigate retail stores' potential demand for the different services a UCC can provide by interviewing retail assistants in a number of stores.

The studies were to some extent performed in parallel with each other. The reason for this was that all the studies were first presented at conferences, and during reviews and "waiting time" to the conferences, the next study began. For example, during the final stages of study B, study C was already in work. The empirical data in study C had however already been collected. Some of the empirical data were used in my master's thesis (Bergvall & Johansson, 2015), but in study C was the frame of reference and analysis were further developed. Since study A is a literature review, it can be viewed as encompassing the whole research process. The literature review supports the frame of references in studies B and C, and previous knowledge from the studies was also used to set up the review. Study A itself was conducted alongside studies B and study C.

The last step in the research process was the final analysis. In this part was each research question was answered. For research question 2, this was done in three steps, all described below. For research questions 1 and 3, one analysis step was performed. The research process is illustrated in Figure 4 below. The dotted line in study B illustrates that the study had begun before my research process.

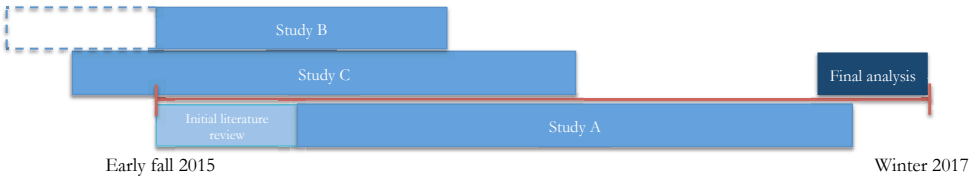



**Figure 4. An illustration of the research process with the five parts**

Each of the different parts of the thesis has different contribution. In Table 3 below are the different parts of the research process related to the method used and to their contributions to the thesis.

**Table 3. The five parts of the research process**

| Parts | Method | Contribution |
|---|---|---|
| **Initial literature review** | Unstructured literature review | Proposes purpose and research Questions |
| **Study A** | Systematic literature review | Input to analysis of RQ 1-3 |
| **Study B** | Interview study of UCC initiatives | Input to analysis of mostly RQ 2, but also RQ 1 and 3 |
| **Study C** | Survey-based interview study of retail stores | Input to analysis of mostly RQ1, but also RQ 2 and RQ 3 |
| **Final analysis** | Inductive mapping | Analysis and discussion in thesis |

### 3.2.1 Initial literature review

The initial literature review was used to provide an understanding of the research areas of city logistics and business models. This was needed in order to formulate the purpose and research questions of this thesis. Both research areas were scanned by searching in databases and dissertations to identify important and reoccurring references, as suggested by Bryman and Bell (2015). The search was performed in databases such as Scopus and Google scholar, where search terms such as city logistics, business model, or synonyms, were used. Through this search, other key terms in both areas could be identified, such as urban freight, city logistics initiative value propositions, and business model canvas, a common practice when identifying a purpose (Patel & Davidson, 2011).

During the course of the review, it became evident that city logistics is often related to reducing negative effects from freight vehicles, e.g. pollution, noise, and traffic congestion. One of the most studied city logistics initiatives was UCC, which has shown potential to reduce the negative effects. Not only have UCCs the potential to reduce negative effects, but also provide an alternative to current distribution systems. However, a number of uncertainties exist with UCCs, one being their financing. The financial aspect is also closely related to the other research area, business models. Business models can be viewed as a number of different elements, of which value propositions and target customer are two. Value propositions were chosen because they are very closely related to UCC services and are often viewed in the literature as an enabler for a UCC to generate revenue. Target Customer was chosen, since UCC customers are the recipients of the value propositions.

After establishing that UCCs were the focus and that value propositions could potentially be the answer, the purpose was set. An important first step was to take the customer perspective, sort out who the customer can be, and what their needs are. In response, the

first research question was formulated as *What needs can UCC customers have?* When discussing the financial aspect, one important part is to investigate what UCCs can provide for its customers. This resulted in the second research question: *What services can UCCs provide and what value propositions can they lead to?* The third research question investigated the potential matches between what UCCs can offer and potential needs of UCC customers. If a match exists, UCC customers could be willing to pay for the services that can fulfil their needs. The third research question was therefore: *How can UCCs' value proposition match needs of UCC customers?*

### 3.2.2 Study A – Systematic literature review

The method used in study A was a systematic literature review and the review focused on a specific subarea within city logistics: a UCC solution. A literature review was chosen because it is a suitable option to gain knowledge in a field, what methods are usually applied, and identify the main researchers in the area (Bryman & Bell, 2015). Secondly, a systematic literature review is often used to identify gaps and summarize different areas within the field (Tranfield *et al.*, 2003; Crowther & Cook, 2007). By using a systematic literature review most of the important journal articles could be identified and the study thus spanned all research questions.

**Selection**

The review targeted all journal articles that had UCC in focus, i.e. used UCC (or synonyms) in either the title, the abstract, or the key words, an approach used by e.g. Wong *et al.* (2015). This was done to only include articles that extensively focus on UCCs. A total of 20 synonyms of UCC were used in the search. The synonyms came from lists in Browne *et al.* (2005) and Wolpert and Reuter (2012). The search included only peer-reviewed journal articles to ensure a high standard among the identified articles, a method used by e.g. Touboulic and Walker (2015).

**Data collection**

Since the study is a literature review, the data collection consisted of journal articles. The 21 search terms were used to search for articles in the databases Scopus, Web of Science, and Business Source Premier. The search resulted in a total of 138 articles being identified. After excluding articles not published in journals, subject areas such as dentistry and medicine, and articles not written in English, the total number of articles was 61.

**Data analysis**

As a first step in the analysis, both researchers read the abstracts of all the identified articles to only include the ones that focus on UCCs. The second step was to read all the articles in full and only include articles that focused extensively on UCCs, not only mention the concept. After both steps were performed had the articles been reduced to 48. During the read-through of the articles, both researchers classified the articles as "more or less relevant", as suggested by Crowther and Cook (2007). An article that was considered "more relevant" focused on UCC, i.e. had UCC in the purpose and/or based the empirical data on UCCs. To increase the scope of the review, a complementary snowball sampling based on the "more relevant" articles was used. After using the same inclusion criterion, eight additional articles were included in the final sample.

When the final sample of articles (56 articles) had been set, a content analysis was performed with a coding manual, inspired by Bryman and Bell (2015). The coding manual was based on a read-through of half of the articles, where dominant areas were identified by both researchers individually. The exact terminology used in the articles was of secondary importance in the identification of potential areas. These areas were later divided into categories and sub-categories, termed themes. When the categories and themes had been set, the remaining articles were placed in the appropriate categories and themes, i.e. an article could be present in multiple categories and themes.

### 3.2.3 Study B – Interview study of UCC initiatives

In this study, a number of existing UCCs were studied to identify critical factors for their business models. An interview study of multiple initiatives was chosen because, in order to identify critical factors it is important to determine that they occur in more than one case. This is in line with how Merriam (2011) describes interviews; to obtain information that cannot be observed. This study first and foremost provided knowledge to research question two and three, identification of UCC services and value propositions, and the relationship to customer needs.

**Selection**

Two central criteria when selecting cases were used. The UCC should still be operational and its business model viable. A viable UCC was in this case defined as a UCC that fulfils the goals set by the owner/initiator. The selection of cases can be related to the targeted selection (see e.g. Merriam's, 2011 description of targeted selection), where these cases were selected according to the two bounded criteria. The cases are well recognized and were also selected to achieve a distribution of different countries, including a Swedish context. The reason for this was the objective of the study to identify why some UCCs work and others do not. The operational and viable criteria thus became important. One person was targeted in all cases, the project leader or the person responsible for the initiative. This person often had overall control and knowledge of the initiative and could thereby provide an overall picture.

**Data collection**

The data collection comprised five cases: three from Sweden, one from Italy and one from the Netherlands. Two researchers were present during all interviews. Having more than one interviewer present has several advantages, e.g. one can focus on the interview while the other interviewer focuses on taking notes and ensuring that all questions are addressed (Bechhofer *et al.,* 1984). Each interview lasted between 40 and 90 minutes. The interview questions were largely guided by a business model canvas used by Quak *et al.* (2014) in a city logistics context. The interview form was the same for all interviews, which made the form standardised (as described by Patel & Davidson, 2011). A high degree of standardisation facilitates comparison of answers (Patel & Davidson, 2011), which was done in the study when critical factors were identified.

**Data analysis**

The analysis aimed to identify factors that were common in multiple cases. As noted, the interview questions were from a business model canvas and the elements from this canvas also have a certain description. The content from the interviews was matched to these descriptions in order to classify the answers from the interviews into different elements in

the business model canvas. The process can be compared to a content analysis. Bryman and Bell (2015) describe a content analysis as coding of text into different categories and themes. This classification enabled a comparison between the cases, which in turn made it possible to identify critical elements, or factors, that reoccurred between cases.

### 3.2.4 Study C – Survey-based interview study on retail stores

The last study focuses on a potential UCC customer type: retail stores in city malls. In the literature, retail stores have been singled out as the potential customer that could gain the most from the use of a UCC. Many of the services UCCs can provide are moreover directed towards retail stores (see e.g. Browne *et al.*, 2007; van Rooijen & Quak, 2010). A survey-bases interview study was chosen to gain a deeper knowledge of this context. The results from study C were mostly used to address research question one: potential needs of potential UCC customers.

**Selection**

The subjects in this study were retail stores in two Swedish cities. The first step was to select the studied city malls and all retail stores within the malls came to be the subjects. Since the purpose of this study was to explore what types of needs retail stores may have (that a UCC can fulfil, and thereby the potentials), the selection of stores was based on geographical proximity. Interviews with retail assistants were selected to attain a high response rate compared to, for example, surveys (Bryman & Bell, 2015). The retail assistants were also targeted because they handle the everyday tasks and could thus describe problems they experienced.

**Data collection**

The data collection consisted of a survey-based methodology, with short structured interviews. A total of 72 retail store assistants in different stores were interviewed. The interviews were based on a structured interview protocol (Patel & Davidson, 2011), where the same questions were asked every time and in the same order. It was important to maintain a fast pace during the interview since the interviews were held in the stores during opening hours. This choice was made because it was assessed that it would be easier to interview them there during their regular work hours. Two researchers took part in designing the questionnaire and two were present during each interview, which allowed investigator triangulation (Patton, 2002).

**Data analysis**

The analysis consisted of determining the potential demand for UCC services. A demand existed if there were gaps between respondents' answers concerning their needs and what the literature has stated that a UCC can provide. The problems the retail stores experience and their requests, for example preferred delivery time and delivery frequency, were listed. The researchers then tried to match these problems or requests to investigate the potential of a UCC; can UCCs fulfil needs (solve the problems) for the type of user? As a last step, independent sample t-tests (see e.g. Montgomery, 2013) were conducted in order to investigate if there were any relationships between number of deliveries a day and experienced provided customer service.

### 3.2.5 Method of final analysis in the thesis

The method for the analysis and discussion in the thesis was divided into four parts: analysis of each research question and linking UCC services to customer needs to fulfil the purpose. All four parts are described below.

**Analysis of RQ1**

The analysis of research question 1 (what needs can UCC customers have) had contributions from both the literature and the studies. The definition of customer needs (in the frame of reference) was used to identify needs from both the literature and the studies. The analysis of research question 1 resulted in a list of all identified needs and descriptions of them. In order to congregate many minor needs or similar needs, but with different names, a first analysis was to create labels for the needs on a higher level. This labelling was performed through a content analysis, where the aim was to identify common characteristic and combine them.

**Analysis of RQ2**

The analysis research of question 2 (what services can UCCs provide and what value propositions can they lead to) was divided into three steps. In the first step, different UCC services from both the literature and the studies were identified. The second step was to identify value propositions, also from the literature and the studies. In the same manner, as for the needs, a content analysis was performed to label the value propositions. The last step, illustrated in Figure 5 below, was to map UCC services to value propositions. The method used was to map the descriptions of the UCC services against the descriptions of the value propositions. An important point was which UCC services can contribute to the value propositions. This step was performed inductively based on the previous two steps.

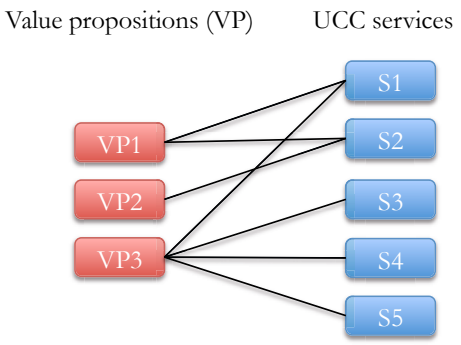



**Figure 5. Mapping between value propositions and UCC services**

**Analysis of RQ3**

The method for the last research question (How can UCCs' value propositions match needs of UCC customers) consisted of matching the outcome of the analysis from RQ1 and RQ2. This matching was based on the description of needs and value propositions. The actual matching was performed inductively, however, based on the descriptions. The analysis for research question three is illustrated in Figure 6 below.

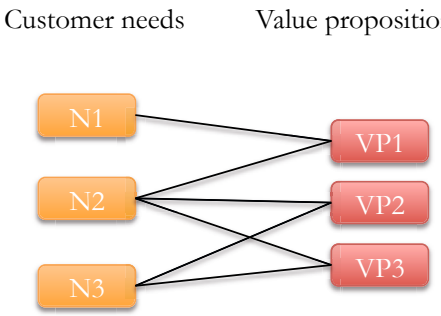



**Figure 6. Matching between potential customers needs and value propositions**

**Linking UCC services to customer needs**

The last part of the analysis was to combine the research questions. As shown in Figure 7 below, the matches from RQ3 were translated into UCC services. No new analysis was needed to perform this part because it was largely based on the previous parts.

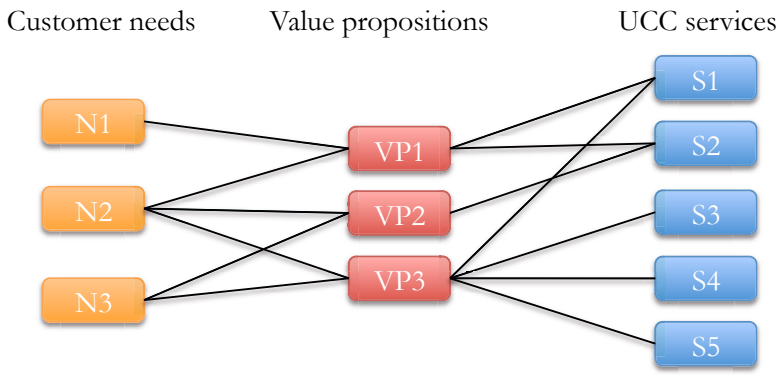



**Figure 7. Matching between potential needs, value propositions, and UCC services**

## 3.3 Trustworthiness

Measuring trustworthiness or quality in qualitative research can be handled in different ways. Two of the more established terms of trustworthiness are validity and reliability.

First of all, Patel and Davidson (2011) state that qualitative studies are more or less unique in their nature and to apply fixed rules or techniques to ensure high validity is often considered problematic. Despite this, some aspects can be used to ensure high validity, for example triangulation, communicative validity, and generalisation. The authors also emphasize that validity should apply during the whole research process.

Triangulation can, for example, mean that the researcher validates the results by selecting different data sources such as different persons, places, or times. Similarly, Bryman and

Bell (2015) describe it as "*using more than one method or source of data in the study of social phenomena"* (pg. 402). Triangulation has been present in all of the studies. In study A, both researchers were involved in the evaluation of which articles should be included in the study and when the different categories were decided. In both cases, the researchers read the articles and identified categories individually. The individual results were then compared. In study B, the identification of critical factors was triangulated. In order to be considered a critical factor, more than one respondent had to express it as important in their system. In study C, the triangulation was made in the analysis. For example, the identified potentials and/or problems occurred in more than one case.

To increase communicative validity, the researcher can support the interpretations by clearly describing the original data so that the reader can form his or her own opinions (Patel & Davidson, 2011). Another way to increase it is to include the respondents of the results and let them give feedback if the results and interpretations are correct. In study A the communicative validity is secured by presenting examples directly from the articles that supported why an article should be placed in a certain category. In study B, the communicative validity is secured by sending the interview protocol to the relevant respondent and having them approve it. In study C it is secured by clearly presenting the empirical data and motivating the analysis.

Patel and Davidson (2011) state that generalisation is often perceived as problematic in qualitative studies. But a qualitative study can be used to understand a certain phenomenon in a certain context. The generalisation can then be done in relation to similar contexts. Generalisation is mostly addressed in study B, where cross-case analysis was performed on cases from different countries. This cross-case analysis was the basis for the identification of critical factors. Identifying reoccurring critical factors from cases in different contexts point to generalizability having been secured.

Different aspects have also been taken into consideration when designing the studies, which can be related to how reliability is commonly described (see e.g. the description from Patel and Davidson, 2011 in quantitative studies, and Bryman and Bell, 2015). For example, in both interview studies, the interview protocols were not altered between interviews. Moreover, in all of the appended papers, the procedures are clearly described, which allows the reader to make his or her own interpretations. This also makes each result traceable.

## 3.4 Reflections on methodology

The labelling of customer needs and value propositions was performed based on the author's perception of the content. Other researchers might identify other labels, which would also result in other types of matches. The exact terminology was, however, of less relevance since this thesis aimed to illustrate examples, not finding the optimal ones.

Mapping of value propositions and UCC services and matching of needs and value propositions were also done by the author based on the content. Other researchers might identify other matches but here again the important thing is not to find the optimal one but rather illustrate it. Also, needs, UCC services, and value propositions were identified

based on the studied UCC literature. If other needs, services, or value propositions were to be identified, this would affect the results.

Since this study takes a general approach when identifying UCC services, value propositions, and needs, independently of certain circumstances (in most cases), results such as a net list of UCC services, needs, and value propositions can probably be used in other UCC systems, i.e. generalizable. The actual matching between customer needs and UCC services, however, is very dependent on the situation. The analysis can act as a basis but to develop a complete framework a better understanding of each UCC customer is needed.

# 4 Summaries of the Appended Papers

*This chapter summarizes the appended paper and presents how the different papers contribute to fulfilling the purpose and the research questions in this thesis. Each summary follows the same structure with a presentation of the purpose, the method used, collected data, results from the analysis, and ends with contribution to the thesis. The chapter begins with a summarizing table of the papers and how they relate to the RQs.*

Table 4 below lists the papers linked with the studies and their contribution. Worth noting is that each study is directly related to a paper. After the table, each paper is briefly summarised and its contribution to this thesis is presented. The contribution will later be used in the next chapter, Analysis and Discussion.

**Table 4. The papers related to the studies, the method used, and their contribution to the thesis**

| Paper | Study | Method | Contribution |
|---|---|---|---|
| Paper I | Study A | Systematic literature review | Frame of reference in thesis, RQ1, RQ2, and RQ3 |
| Paper II | Study B | Interview study of UCC initiatives | Mostly RQ2, small part to RQ1 and RQ3 |
| Paper III | Study C | Survey-based interview study on retail stores | Mostly RQ1, small part to RQ2 and RQ3 |

## 4.1 Paper I – Urban Consolidation Centre: A literature review, categorisation and a future research agenda

### 4.1.1 Summary of Paper I

Urban Consolidation Centres (UCC) is often viewed as a city logistics initiative that can reduce negative social and environmental impact connected to the distribution of goods in urban areas. Despite their potentials, the centres seldom become long-lived. This points to knowledge gaps in this area. The purpose of this paper is therefore to provide a systematic literature review of journal articles focusing on UCC-based solutions, describe dominant categories and themes in the area, and identify gaps in order to propose a future research agenda and insights for practitioners.

The method was a systematic literature review aimed at identifying all journal articles published with UCCs in focus. The search terms were only UCC or synonyms of it because the aim was to identify all journal papers that focuses on UCCs and the term differs a great deal. After initial screening of the search results' abstracts, a read-through of all hits and a snowball sampling, the number of articles had been reduced from 138 to 56. These 56 articles were analysed through a descriptive analysis and a content analysis. The content analysis was also part of the categorization of categorises and themes.

A total of five categories were identified, all containing a number of sub-categories, which were termed *themes*: stakeholders, design of distribution structure, design of transport

resources, environmental and social considerations, and economic considerations. This was the first part of the purpose. The second was to identify gaps, both in each category and outside them, e.g. from the descriptive data such as methodology used. Multiple knowledge gaps were identified, for example the perspective of affected stakeholders is often lacking; environmental impact is often expressed in qualitative terms, but not quantified; few articles go in-depth and research how UCCs could generate revenue; economy of scale is often mentioned in articles but seldom studied; and primary data is lacking in articles.

The research agenda was presented at the end of the study. The idea of the research agenda was to take the identified gaps and propose what areas future research should address. Examples from the agenda were: "*UCC services can be viewed as the most enabling aspect for a UCC to generate revenue. However, these services are seldom investigated in detail or related to the interest and willingness to pay from the perspective of different stakeholders. Furthermore, economies of scale are both viewed as a prerequisite for a UCC (ensure handling of a high enough amount of goods) and a potential to perform activities at the UCC in a more efficient matter. However, very few studies provide any practical guidance for the system development with regard to the scales necessary for viability.*" (Paper I, pg. 16)

### 4.1.2 Contribution to the thesis

The paper primarily contributes to the frame of reference since the paper is a literature review. Many of the identified UCC services and value propositions were identified during this review. The paper has also acted as an important starting point for the thesis. Even if the paper is not used directly in the analysis and discussion, the paper has an important role in supporting the arguments in chapter. Since the analysis and discussion are partly based on the literature, the paper contributed new references with new insights.

## 4.2 Paper II – Critical Factors for Viable Business Models for Urban Consolidation Centres

### 4.2.1 Summary of Paper II

The second paper used an interview study approach in order to investigate five different viable UCCs around Europe. The point of departure was business model literature and how it can be used in a city logistics context. A major lack of knowledge within city logistics concerns the use of business models and why some initiatives work and others do not. In response, the purpose of the paper was to analyse critical factors for viable business models for city logistics initiatives involving UCCs.

The interviews were held with either the project manager or the initiator. The cases were the UCC in Eskilstuna, the cooperative UCC in Österlen, the UCC in Gothenburg, a UCC from the Netherlands ($ECO_2CITY$), and a UCC from Italy (Lucca). The basis for the interview questions was the business model canvas used by Quak *et al.* (2014). Part of the analysis was to interpret the respondents' answers and categorise them according to the business model canvas. The analysis consisted of a cross-case comparison to identify critical factors that the respondent pointed out as important.

A total of seven different critical factors were identified: the ability to scale the business model up and down, including attracting new users and expanding offered services; ability to continuously develop and adapt the business model to a dynamic environment; maintain the entrepreneurial role of the initiator; view authorities as potential customers, since they benefit from UCCs; generate revenue by offering new and innovative services; logistics and supply chain competes in the organisation to access potential value streams in the supply chain; the ability to take full advantage of advanced IT systems.

### 4.2.2 Contribution to the thesis

This paper primarily contributes to research question 2 by identifying UCC services and value propositions for different customers. Through the cases, two innovative UCC services have been identified: one from the Eskilstuna case (e-commerce with used products) and one from the Gothenburg case (advertising on freight vehicles from the UCC). The paper also highlights different potential value propositions for different customers, for example potential to save money from the use of e-commerce with used products, TPs do not have to adapt their vehicle fleets to fit regulations in different cities, a more attractive city with fewer freight vehicles, and good publicity from being associated with a "green solution". A contribution to research question 1 was also identified: a need for authorities, residents, receivers, and property owners formulated as need for more attractive city with fewer freight vehicles.

## 4.3 Paper III – Urban Consolidation Centres: Retail stores' demand for UCC-services

### 4.3.1 Summary of Paper III

Urban Consolidation Centres (UCCs) are often perceived to reduce negative effects from distribution of goods, but also to improve the situation for retail stores and have the potential to reduce their cost. Despite the potentials, few studies investigate the perception of retail stores on UCCs. The purpose of the paper is to explore retail stores' potential demand for different services that a UCC could provide in order to foster the development and implementation of UCC solutions aimed towards more economically feasible business models. The method consisted of survey-based interviews with retail store assistants at 72 stores. The aim of the analyses was to investigate retail stores' potential demand for services that UCCs can provide.

The findings provide arguments how retail stores can benefit from the use of UCCs, and potentially pay for the services. Multiple stores' perceived the time of delivery as problematic as well as some of the in-store logistics activities; both hindered them to provide expected customer service. The paper points to the financial aspect and cost awareness. The studied retail stores' performed activities in a non-cost efficient manner but were unaware of it. UCCs have the potential to increase the customer services that stores' provide, however, this was not an argument we found in the study.

### 4.3.2 Contribution to the thesis

The paper contributes mainly to research question 1, by identifying potential customer needs. The point of departure in the paper was to investigate what type of problems the

retail assistants experienced and if the problems affected the provided customer service. The paper contributes to the analysis by identifying a number of needs, for example: a majority of the respondents requested earlier and more fixed delivery times, the retail assistants experienced delivery of goods and in-store logistics activities to be time-consuming, and most of the stores requested more storage. A potential need was also identified for the urban transport provided (UTP). The respondents stated that they let the courier wait at the entrance if they were busy, sometimes up to five minutes. If many stores do this, the delivery time for the UTP will probably be longer. A new potential UCC service was also identified: registration in the computer system.

# 5 Analysis and Discussion

*The analysis and discussion uses the contribution from papers II and III together with the literature presented in chapter 2 to elaborate on answers to each research question. RQ1 consist of one part, RQ2 consists of three steps, and last research question uses a combination of the analysis and discussion of RQ1 and RQ2. The chapter ends with a section where the research questions are linked together, in order to fulfil the purpose.*

## 5.1 RQ1: What needs can UCC customers have?

From the frame of reference, a customer need can be either a customer interest or some type of problem that the customer has. The reason for this is that in the studied UCC literature, the term need is seldom used. When it is used in the few cases, the focus is on the receivers. Even though the term is seldom used, when investigating what benefits UCCs can provide for its customers, it is important to identify what the customers may actually need. The translation into needs is also a part of the analysis and the different identified needs are presented in Table 5 below.

Worth noting from the studied UCC literature (see e.g. van Rooijen & Quak, 2010; Aastrup *et al.*, 2012), and also from study C, is that the perspective of receivers is often taken regarding potential needs. In order to fully understand the needs of all UCC customers, and thereby further explore how they can benefit from the use of a UCC, it is necessary to investigate other potential customer perspectives as well.

In Table 5 below, the identified and translated needs are presented. Each need from the table is thereafter presented in **bold** with input from the literature and the studies B and C. The same presentation structure is used for each need. The information from the literature is presented first, then the data from the studies, and lastly the analysis and discussion. It is also specified for all needs who the potential customer is, with the point of departure from the eight customer groups presented in section 2.1. Several needs can have multiple potential customers, and several customers can have more than one need. Lastly, the analysis and discussion also feature a potential need for customers that is not mentioned in the studied UCC literature, i.e. identified in the studies.

In the same manner as benefits from a UCC, this thesis strives to provide a basis for how different customers can benefit from UCCs, i.e. the discussion below will only include positive outcomes. However, one example is provided last in the need **reduce disturbance of personnel**, to illustrate that needs can also have a negative effect.

**Table 5. The identified needs, both from the literature and form the studies**

| Potential needs | From literature | From studies |
|---|---|---|
| Increased cost efficiency | X | X |
| Reliable deliveries | X | X |
| Reduce number of freight vehicle in urban area | X | X |
| Reduce disturbance of personnel | X | X |
| Provide high customer service | X | X |
| Generate revenue | X | X |
| More storage | | X |

The table shows that the needs identified from the literature and the studies are largely in agreement. The only exception was more storage, which was only identified in the studies.

**Increased cost efficiency**: From the literature, various potential customers have cost efficiency as one of their main needs. OECD (2003), and Quak and Tavasszy (2011) mention suppliers, receivers, and transport providers (TP). From study C, most of the respondents were more worried about increased cost instead of understanding "the big picture". For example, they increased their workforce to cope with deliveries and in-store logistics activities. This is somewhat contradictory to the literature. Retail stores should probably be interested in cost efficiency but, as study C illustrates, many retail stores find other solutions, which probably result in inefficient cost management.

Another perspective of the potential to increase cost efficiency for TPs and receivers is identified in study C. Some of the retail stores stated that the delivery driver (from the TP) had to wait at the store entrance if the personnel were busy with customers. This implies that the potential to increase cost efficiency is dependent on which UCC customer ends up with the cost. To explain, reducing or eliminating this waiting time can reduce the total delivery time for TPs, i.e. increase their cost efficiency or for the receivers reduce the cost for deliveries (if they indirectly pay for the waiting time).

**Reliable deliveries:** An adequate delivery system with reliable deliveries can be viewed as a need for suppliers, TPs and receivers (OECD, 2003; Quak & Tavasszy, 2011). Aastrup *et al.* (2012) and Gammelgaard *et al.* (2016) also note that delivery times can result in problems for retail stores, i.e. viewed as a need. Regarding delivery frequency, Aastrup *et al.* (2012) note that the retail stores in their study requested reduced delivery frequency. As can be seen in study C, the majority of the respondents stated that they preferred a more fixed and pre-determined time of delivery. The most preferred time for deliveries was at opening or before noon. In the current situation, the deliveries could arrive at any time during opening hours for almost half of the respondents, which resulted in a number of problems for them. Regarding delivery times, the study supports the literature, but a few of the respondents also requested increased delivery frequency, which contradicts Aastrup *et al.* (2012). Even if the study to some extent contradicts Aastrup *et al.* (2012), it should rather be viewed as complementary. Thus, receivers can be interested in both increased and a decreased delivery frequency dependent on their situation.

**Reduce number of freight vehicles in urban areas:** Regarding needs such as reduce emissions, reduce traffic congestion, available parking spaces, and not having freight vehicle parked outside buildings are congregated in the need reduce the number of freight vehicles in urban areas. OECD (2003), Ballantyne *et al.* (2013), and Quak and Tavasszy (2011) note that this can be a need for the authorities and the residents. Björklund and Martinsen (2014) also mention property owners, as they do not want to have freight vehicles blocking parking spaces and occupying the streets. All five cases in study B strove to attain a more attractive city, increased traffic safety, and reduced environmental impact from freight vehicles. The study thereby supports the literature as regards both the need and the recipients, i.e., authorities, residents, and property owners.

Having drivers wait at the receivers (in this case retail stores from study C) can in a wider extension have negative effects on authorities and residents. The number of freight vehicles will probably not decrease but letting the drivers wait can lead to blocking of unloading docks and freight vehicle on public squares. This further supports the need for authorities, residents and property owners.

**Reduce disturbance of personnel**: During, for example, retail stores opening hours can the personnel be disturbed by either arriving deliveries or handling in-store logistics activities (Aastrup *et al.*, 2012). This was also found in study C, where 22 out of 72 respondents felt disturbed by the reception of goods, and 12 (out of 72) were disturbed by in-store logistics activities. For example, activities such as price-tagging products and attaching anti-theft devices were perceived as time-consuming and would in some cases hinder the respondents from helping their customers. Also from study C, 61 of 72 respondents preferred deliveries before noon. A probable reason for this is to reduce the disturbance of personnel since retail stores are often more populated in the afternoon. This need is thus mainly directed towards some types of store, i.e. part of the customer group 'receiver'. Related to this, some stores were interested in increased delivery frequency and stated that this was because it could lead to fewer products each time. This could result in less time being spent each time and in turn the personnel being less disturbed by the deliveries. By extension, however, this is an example where the effects might not benefit the retail assistants from a holistic perspective. The retail assistants might perceive the time spent to be lower, but the total time, however, will probably be higher with more deliveries.

**Provide high customer service**: Aastrup *et al.* (2012) note that providing high customer service is a need for receivers (especially stores). This is also very closely related to reducing disturbance of personnel, presented above. From study C, where the empirical data was linked to perceived offered customer service by retail store assistants, a number of the respondents did not feel that they offered high enough customer service. 22 out of 72 respondents felt that their customer service was negatively affected due to arriving deliveries and in-store logistics activities such as attaching anti-theft devices, unpacking goods, and price-tagging products. Another aspect of providing high customer service is the availability of products. Respondents in study C expressed for example that incoming goods were left unpacked if the personnel were occupied. Furthermore, a majority of the respondents in study C also requested more storage space, which can also mean that the availability of products was not always at an expected level. These examples imply that the

perceived offered customer service was not always at the anticipated level. The examples show a number of problems, but only 22 respondents felt that they affected the offered customer services. One reason can be interpreted from the first need (increased cost efficiency); stores often found alternative solutions to the problems, but these are probably not efficient from a cost perspective. The study supports the literature; most of the stores were largely focused on providing high customer service, in many cases more than identifying cost-effective solutions.

**Generate revenue**: Two UCC customers are identified where the interest is to generate revenue. Browne *et al.* (2005) mention UCC operators as a potential customer. UCC operators start up a business. Although not mentioned in the literature, but in the same manner as the UCC operator, the urban transport provider (UTP) should also be interested in generating revenue, since a new business opportunity emerges. Almost every commercial company is interested in generating revenue and a UCC can result in new business opportunities. Worth noting is that suppliers, TPs, and receivers are of course also interested in generating revenue. However, generating revenue is viewed in the context of "new businesses", while increased cost efficiency covers existing operations.

**More storage**: More storage is a need that a majority of the respondents in study C mentioned. They stated that they were interested in additional storage, either permanently or during peak sales periods, e.g. Christmas. This need was not found in the literature, but it should not be viewed as contradictory. Several authors (e.g. Browne *et al.*, 2005; Aastrup *et al.*, 2012) have noted for example that UCCs could offer this service. This is an example where not addressing the perspective of UCC customers can lead to omitting to identify their needs.

## 5.2 RQ2: What services can UCCs provide and what value propositions can they lead to?

The analysis of research question 2 is divided into three steps. The first presents the identified UCC services. In the second step, all identified value propositions are presented, together with an analysis and discussion of each value proposition. The third step consists of a discussion of how value propositions can be mapped to one or multiple UCC services.

### 5.2.1 Step 1 – identify UCC services

From the literature review, a number of UCC services have been identified and these are presented in the column *From literature* in Table 6 below. A further description of each service is given in the frame of reference. The identified UCC services in studies B and C are also presented in the table, and these are described after the table.

**Table 6. List of identified UCC services from the literature and from the studies**

| UCC services | From literature | From study B | From study C |
|---|---|---|---|
| Nightly deliveries | X | | |
| Off-peak deliveries | X | | |
| Request delivery time | X | X | |
| Request delivery frequency | X | | |
| Stockholding at UCCs | X | X | |
| Use of environmentally friendly vehicles | X | | |
| Pre-retail services | X | X | |
| Ordering processes | X | | |
| End customers can collect goods at UCCs | X | | |
| Waste and return management | X | | |
| Home deliveries | X | | |
| Quality and quantity check | X | | |
| Charging stations | X | | |
| E-commerce with used products | | X | |
| Advertisement | | X | |
| Registration in computer system | | | X |

From studies B and C a total of three services were identified that are not found in the studied UCC literature. The service *e-commerce with used products* is identified in the Eskilstuna case in study B. In this case, the service means that the UCC can store leftover furniture previously used by the receivers. The furniture at the UCC is then sold through an e-commerce system, where other receivers can buy used furniture at a reduced price. The Eskilstuna case provides an example of the service, but the services can probably also be viewed in a wider context. Retail stores could, for example, use such a system to sell used decorations, product displays, and shelves. Other retail stores could buy these, which can lead to a reduced purchasing cost for the buyer and the seller can create new income.

The second identified service is from the Gothenburg case, also in study B. The service can be called *advertisement*. The example from the Gothenburg case is advertising on freight vehicles originating from the UCC. The freight vehicles are in this case "electric trains", which is seen as a "green alternative" and a large variety of companies are interested in buying advertisement space on them according to the project manager in Gothenburg. This service could also probably be viewed in a wider sense. If UCCs were seen as an environmentally friendly alternative, companies would probably want to be associated with it, for example through advertising. Any company can thus use the service.

The third potential UCC service was identified in study C and it was requested by one of the respondents. The service is *Registration in the computer system,* meaning that UCCs can potentially, during the consolidation process, record the quantity of products. A

prerequisite for this service to work is an integrated IT system that connects UCCs with receivers. This service can in a wider context, with an integrated IT system, free up time at the receivers and can also be directed towards other receivers then stores, e.g. offices.

Other services that are identified in the studies, such as storage of goods, pre-retailing activities, and fixed delivery times, are already present in the list from the literature. These services are identified in study B and can be viewed as confirmation of the services described in the literature.

### 5.2.2 Step 2 – identify value propositions

Value propositions from both the literature and the studies are presented below, with their direct and indirect effect, together with which UCC customer can be affected. In order for the value propositions to even be possible, a UCC is needed. Consequently, in the analysis and discussion below, it is assumed that the system includes a UCC where consolidation is considered a prerequisite. The text in **bold** below is the value propositions.

**Better transparency throughout supply chain:** As both Browne *et al.* (2005) and BESTUFS (2007) note, better transparency throughout the supply chain can be a value proposition for all customers in a UCC system. The authors note that the suppliers, TPs, and receivers can improve their planning due to earlier information regarding orders. Study C supports this; by receiving correct and earlier information regarding time of deliveries, retail stores can more easily plan their manning. By extension this can result in a potential to save money for stores by not overpopulation the stores with personnel. Another example comes from the Österlen case in study B, where the owner of the system gathered route data from the UTP. This data is used to optimize the routes for the UTP but also give the owners (in this case three local authorities) knowledge of the system, the logistics demands, and logistics cost. The local authorities benefit from it during negotiations with UTP (they were well informed and used this knowledge to negotiate the price) and used the information to see where the system was inefficient. This indicates that the owners of the system can benefit with improved transport planning and potential to save money.

A perspective that is not mentioned in the studied UCC literature is from the UTP. In a UCC system, more and earlier information can improve their planning for UTPs. By extension, easier planning can lead to increased fill rates of freight vehicles and the total travel distance for freight vehicles can in turn be reduced. These benefits can, for example, lead to a potential to save money.

**Improved reliability of deliveries (delivery time and frequency):** This value proposition is mainly directed towards the receivers of goods. Due to shorter delivery distances, from UCC to receivers, Aastrup *et al.* (2012) and Browne *et al.* (2005) mention that receivers have a greater opportunity to choose both the delivery time and the delivery frequency. By knowing and having the opportunity to control the times of deliveries, the personnel at the receivers (applies mainly to stores) can benefit for example by being less disturbed by deliveries and personnel planning can be improved. Both can lead to better service to their customers (Browne *et al.*, 2005; Aastrup *et al.*, 2012). From study C, 21 out of 30 retail stores that had unreliable delivery times requested more specified time of

delivery. In some cases, the respondents also noted that inconvenient deliveries hindered them in their daily work, such as helping customers. Furthermore, in the same study, multiple respondents emphasised that the workforce was dependent on the delivery time. This can be interpreted as not knowing the time of delivery may result in inefficient manning, which in turn can lead to inefficient cost management. In this case, the study supports the literature.

Studies B and C also imply that improved delivery reliability may also positively affect the UTP. Based on the comment by respondents in study C that they let the delivery driver wait if the personnel were busy may lead to inefficiencies for UTPs. For example, this can lead to inefficient deliveries and waiting time, and by extension lead to more stressful work (due to delays) and more time-consuming delivery routes. Ultimately, this can result in reduced profit margins for the UTP. The receivers could potentially plan for the deliveries if the delivery time were known, which can result in a reduction in delivery time for the UTP.

**New business opportunities:** New business opportunities are directed towards UCC customers who previously did not have a business that UCCs replace. For example, new business opportunities can be for the UCC operator (Browne *et al.*, 2005) because it was not an option without a UCC. Compare this to the fact that for example TPs' deliveries will change, but this is not a new business. Both the UCC operator and the UTPs have the potential to make profit due to new business opportunities. Browne *et al.* (2005) also mention that authorities can generate revenue by licensing the UCC concept.

**Good publicity:** From the Gothenburg case in study B, this value propositions can be directed towards any company. The freight vehicles, according to the project manager, are seen as an environmentally friendly option for deliveries, in terms of fuel and size, and companies want to be associated with it. The same thing can be said in the Lucca case, where the UCC was introduced to reduce the number of large freight vehicle in the historical town. By extension, being associated with UCCs can be viewed as gaining good publicity. Good publicity can, in a wider context, give benefits such as more market shares due to customers wanting to be associated with it. Good publicity can also be directed towards authorities. Benefits can include being viewed as a good example and possibly attract new businesses.

**Avoiding inefficient last mile deliveries:** This value proposition is directed towards TPs and is achieved by dropping off their goods at UCCs. Dropping of the goods at UCCs instead of entering urban areas can reduce the delivery time (Browne *et al.,* 2005; Aastrup *et al.,* 2012). Allen *et al.* (2012) note that TPs can save time and money by not entering congested urban areas, Gonzalez-Feliu *et al.* (2014) mention that they can improve their efficiency, and Browne *et al.* (2007) state that TPs can save money and make their planning easier by having the opportunity to deliver throughout the whole day, i.e. not being fixed to certain delivery times. Another benefit noted, in Gothenburg and $ECO_2CITY$ by the respondents, is that TPs do not have to adapt their vehicle fleet to local requirements, such as fuel consumption and vehicle size. Not having to adapt their fleets to specific local requirements implies a potential for cost saving for TPs, both as investment cost and an otherwise needed cost for transhipment. The studies support the

literature in this value proposition, also adding the indirect effect of not having to adapt their vehicle fleet.

**A more attractive city:** This value proposition is mainly directed towards authorities and residents (Browne *et al.*, 2005; Nordtømme *et al.*, 2015), not to the same extent but Browne *et al.* (2005) also add property owners and receivers. It is also one of the most important value propositions because this is in many cases the reason for introducing UCCs, see e.g. Browne *et al.* (2005), van Rooijen and Quak (2010), and the cases in study B. A more attractive city includes for example fewer freight vehicles, less traffic congestion, fewer emissions, reduced risk of accidents (due to fewer freight vehicles), less noise, and more suitable freight vehicles for city distribution. Study B supports this discussion since it was a driving force in all of the studied cases. This implies that authorities and residents can benefit from obtaining a nicer city with reductions in for example traffic congestion and emissions, while property owners and receivers can benefit from gaining more attractive shopping areas and not having freight vehicles parked outside the buildings. In a wider context, a more attractive city can increase the number of shoppers, which can increase profits for receivers, mainly stores, while property owner can either rent out space at a higher price or potentially see an increase in the value of their properties.

**More efficient store operation:** This value proposition is mainly directed towards the receivers of goods, especially some types of store. First of all, retail stores, can move some of their storage to the UCC, and thereby free up space at the store (Aastrup *et al.*, 2012). Retail stores can additionally increase the product ranges in the stores by having storage close by (Aastrup *et al.*, 2012). Both Aastrup *et al.* (2012) and Browne *et al.* (2005) also argue that storage at UCCs can be used during seasonal peak periods, such as Christmas. Freeing up space at stores can lead to benefits such as cost savings if the space is rented out. Freeing up space can also lead to a greater opportunity to increase the sales area (Browne *et al.*, 2005; Aastrup *et al.*, 2012), which can lead to increased sales. From study C, a majority of the respondents were interested in additional storage. In the Eskilstuna case, a "new" perspective is provided where the storage at the UCC is used for ordering larger quantities of certain products to take advantage of bulk discounts. Using the storage can lead to the possibility to increase the product range, which can attract new customers and can in turn result in increased sales and higher customer service. The same thing can be said about using storage at UCCs during peak periods to avoid products being "out of stock". Agreement with the literature is found in the studies to some degree, even if the literature provides more examples.

Time-consuming activities such as unpacking of large consignments, price-tagging of products, and placing products directly on shelves are examples of activities that UCCs could perform (Browne *et al.*, 2005; Aastrup *et al.*, 2012). The findings from Study C suggest that outsourcing such time-consuming activities can make it easier for the personnel to run the stores. By extension, if personnel can focus on their core activity, selling products, this may lead to more time available for the personnel to provide better customer service.

**Offer route planning:** From the Österlen case, the owner of the UCC system collects information on the delivery routes from the UTP. This information is, among other things, used to plan the routes in the system. The route planning is used by the UTP and the planning of routes illustrates a potential for the UTPs to reduce their delivery time due to more efficient routes.

**Provide logistics knowledge:** In the Eskilstuna and $ECO_2$CITY cases, logistics knowledge in the daily operations at the UCCs is considered very important and directed towards both the UCC itself and its customers. One person in Eskilstuna has this knowledge and that person has a major role when identifying new services and value propositions. This value proposition was not found in the studied UCC literature, and therefore adds to it. In a wider context, offering this value proposition to UCC customers can lead to the possibility to identify new services and value propositions. This can be interpreted as benefiting both the UCC operator and the customers. The UCC operator can gain new customers and develop the operation while the customers can gain new benefits from the new services.

### 5.2.3 Step 3 - mapping UCC services to value propositions

UCC services and value propositions are mapped to each other in the last step and the mapping is based on the previous two steps. This means that the descriptions of UCC services and the value propositions are found above. This step strives to illustrate and find connections for how UCC services can be mapped to the value propositions. **Bold** text in the following denotes the value propositions and the bullet points denote the UCC services that can be used to contribute to the value proposition. Related to the discussion in the first research question, that the perspective of receivers is generally taken, it is also the case here. The receivers have both most value propositions directed towards them but also most of the UCC services. This further point to the need to also understand how other potential UCC customers can benefit from the use of UCCs.

Worth noting is that in almost all cases, one service might be enough to contribute to the value propositions. However, by using multiple UCC services, the indirect effects associated with the value propositions can probably be even greater. Also, in order to provide services and value propositions, a UCC is a prerequisite, i.e. consolidation is included. Depending on which UCC customer is targeted, the value propositions can have different combinations of UCC services. The mapping below will therefore clearly address different UCC customers.

**Better transparency throughout the supply chain**

UCC services that can contribute:

- Request delivery time
- Request delivery frequency
- Ordering process
- E-commerce with used products
- Registration in computer system

For suppliers, TPs, receivers and UTPs the UCC services request delivery time, request delivery frequency, and ordering processes can contribute to better transparency

throughout the supply chain. For the mentioned UCC customers, receiving information earlier regarding deliveries (due to the request for time and frequency) and insight about what, for example, retail stores order (through ordering process) indicate more and earlier information in the supply chain. This can results in improved planning of the workforce from receiving information earlier.

For UTPs, e-commerce with used products can also contribute to the value proposition. UTPs are needed to handle the transports of products, both collecting and delivering the products to the buyer. To be able to perform this, the UTP needs to know what to collect and where.

**Improved reliability of deliveries**
UCC services that can contribute:

- Request delivery time
- Request delivery frequency
- Quality and quantity check

Improved reliability of deliveries is directed towards receivers and UTPs and the services that can contribute to it are request delivery time and frequency. Reliability of deliveries can be increased if the receivers can request delivery time and frequency, due to clearer and more reliable information. The benefits for receivers imply better manning of the stores due to more reliable deliveries. The benefits for UTPs can be interpreted as improved planning of deliveries.

For receivers, the service quality and quantity check may also be used to contribute to the value proposition. Increased reliability with the right quantity and expected quality of the products can reduce unnecessary work at the receivers.

**New business opportunities**
UCC services that can contribute:

- None identified

The UCC operator is affected since the operator is in charge of the daily operations of the UCC. The possible affected UCC customer is UTPs. In both cases, the consolidation and distribution are probably enough to contribute to new business opportunities. In a wider context, the benefit for the customer and the UCC operator is the potential to generate revenue through the new business.

**Good publicity**
UCC services that can contribute:

- Use of environmentally friendly vehicles
- Advertisement

This value proposition can be directed towards any company or authority. Use of environmentally friendly vehicles is a service that speaks for itself. Using environmentally friendly vehicle is viewed as a "green alternative", i.e. good publicity. Advertising on, for example, environmentally friendly vehicle is probably also considered good publicity. This

implies that if UCCs are viewed as an environmentally friendly solution, being associated with it can probably give good publicity and in turn potentially lead to increased market shares.

**Avoiding inefficient last mile deliveries**
UCC services that can contribute:

- None identified

This value proposition is only directed towards TPs. By using UCCs, TPs do not have to enter the urban areas. By extension, benefits such as saving delivery time and resources such as not having to adapt the vehicle fleet can be achieved for TPs.

**More attractive city**
UCC services that can contribute:

- Use of environmentally friendly vehicles
- Waste and return management
- Request delivery time

The value proposition and all services can be directed towards authorities, residents, receivers, and property owners. As noted, a more attractive city is characterised by fewer freight vehicles and change of vehicle type. Using environmentally friendly vehicles indicates that emissions and noise levels can be reduced. Also if electric vehicles are used, the total energy use can be reduced. Furthermore, changing vehicles at UCCs may also lead to smaller delivery vehicles, which can also characterise a more attractive city. Receivers requesting delivery time can reduce the number of freight vehicles since transports can be planned better. Waste and return management can further give a more attractive city, due to the UTP being able to collect waste and returns on its regular delivery routes. By extension, authorities and residents can benefit from living in a more attractive city, while receivers and property owners can benefit from a more attractive city area with fewer freight vehicles, which in turn can increase the attractiveness of that area.

**More efficient store operations**
UCC services that can contribute:

- Request delivery time
- Request delivery frequency
- Stockholding at UCCs
- Pre-retail services
- Ordering processes
- End customers can collect goods at UCCs
- Waste and return management
- Home deliveries
- Quality and quantity check
- Registration in computer system

More efficient store operation is directed towards receivers, in particular some types of store. All the above-mentioned services indicate a contribution to more efficient store

operations. Request delivery time and frequency has already been mentioned. Stockholding at UCCs is a prerequisite, for example, moving part of the storage to a UCC and using it as a local buffer to avoid running out of stock. Pre-retail services can be used to outsource some time-consuming activities such as price-tagging and unpacking of large consignments. By outsourcing activities, the personnel can focus on selling products and the outsourced activities can potentially be handled more efficiently due to large-scale advantages. Ordering process follows the same argument as pre-retail services. By offering the services end customers can collect goods at UCC and home deliveries, the number of customers in the stores can be reduced, but not necessarily sales. This implies that the personnel focus on new customers. If the UCC operator or UTP handles waste and returns, the personnel in the stores can use their time for other activities. Furthermore, if the UCC performs quality and quantity checks, issues can be detected earlier and the personnel thus do not have to deal with them. Lastly, registration in computer system seemed to be a time-consuming activity. By outsourcing it, the personnel can spend that time on other activities.

**Offer route planning**
UCC services that can contribute:

- None identified

Offer route planning is directed towards the UTP. In other words, to be able to offer it the UCC operator needs information and some kind of system for planning the routes. Receiving detailed route planning implies that the UTP may benefit from shorter and more efficient delivery routes.

**Provide logistics knowledge**
UCC services that can contribute:

- None identified

Providing logistics knowledge can be directed towards any company and also the UCC operator. By extension, this can be a very important value proposition because if a person in the daily UCC operation possesses logistics knowledge and is aware of problems for different UCC customers, that person can probably find a way to solve these problems (see e.g. the Eskilstuna case), which can result in new ways to offer services and thereby a possibility to generate revenue to UCCs.

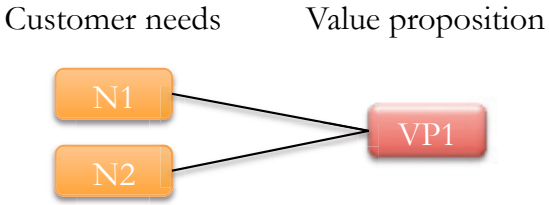
## 5.3 RQ3: How can UCC' value propositions match needs of UCC customers?

In the last research question, the needs of UCC customers are matched with value propositions, i.e. which value propositions can contribute to fulfilling the needs. The analysis and discussion are based on the previously presented reasoning in the research questions above. This also results in further descriptions being able to be found above. The point of departure is the identified needs from research question 1. This also implies that only the needs identified will be presented below and a match exists when a need has corresponding value propositions. Conversely, value propositions but no matching needs,

are called gaps and these are presented later in the chapter. In the same manner as the mapping between UCC services and value propositions, this analysis and discussion strives to illustrate examples of how they can be matched. In the following, first is the explanation of the matching between needs and value proposition presented, where the **bold** denotes the customer need. After all customer groups are presented are the needs and value propositions summarized in Table 7. For suppliers and receivers is also an illustration of the matches provided to exemplify how these matches can look. The figures are based on Figure 6 in the methodology.

**Suppliers**

For suppliers, more and earlier information due to improved transparency in the supply chain may allow suppliers to plan their distribution more efficiently. By extension, more effective distribution of goods can lead to lower distribution cost. This can in turn lead to **increased cost efficiency** for the supplier with reduced distribution cost. Similarly, earlier and more reliable information can lead to more **reliable deliveries**. Suppliers receiving information earlier implies that deliveries can be planned more easily and more efficiently. Below in Figure 8 the suppliers' customer needs and value propositions illustrated.




N1=Increased cost efficiency, N2=Reliable deliveries, VP1=Better transparency throughout supply chain

**Figure 8. Illustration of the matching between customers needs and value proposition for suppliers**

**Receivers**

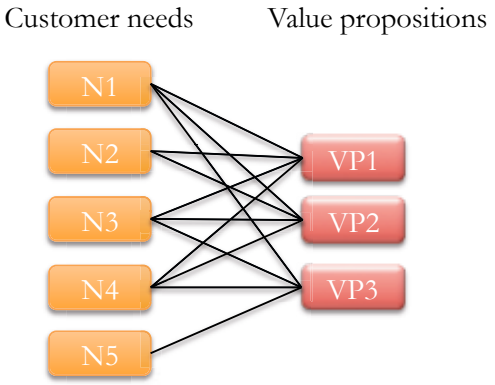
In the same manner as for suppliers, more and earlier information (due to better transparency throughout the supply chain) may imply that manning at the receivers can be improved, which can potentially lead to **increased cost efficiency**. Improved reliability of deliveries and more efficient store operations can by extension also lead to reduced cost. With improved reliability of deliveries, manning can also be improved. With more efficient store operations, the manning can also be planned better and time-consuming activities can be outsourced. Even if this thesis focuses on the positive outcomes of using UCCs, adjusting the workforce can lead to a reduction in the workforce, i.e. make some of the workforce redundant. The literature and the studies somewhat contradict each other. In study C, respondents often failed to see the bigger picture, which can make it difficult to increase cost efficiency. However, by providing them with concrete examples of how they can benefit may help them change their mind.

Almost the same arguments for **reliable deliveries** as for increased cost efficiency can be used. Earlier information regarding the deliveries and improved reliability of them can both contribute to more reliable deliveries.

Personnel at receivers, mainly stores, can for example be disturbed by deliveries and time-consuming activities. With value propositions such as better transparency throughout supply chain and improved reliability, more and earlier information can result in improved planning, which can potentially reduce the disturbance. Outsourcing time-consuming activities can also by extension result in a **reduction in disturbance of personnel**.

**Provide high customer service** is very closely related to the reduce disturbance of personnel and the same arguments can be used. By not being disturbed by deliveries or activities, the personnel can provide higher customer service.

The value proposition more efficient store operations only partly contribute to **more storage**. However, from the description of the value proposition, it is a clear match since the service stockholding at UCC is contained in more efficient store operations. Below in Figure 9 are the matches between customer needs and value propositions for receivers illustrated.




N1=Increased cost efficiency, N2=Reliable deliveries, N3=Reduce disturbance of personnel, N4=Provide high customer service, N5=More storage, VP1=Better transparency throughout supply chain, VP2=Improved reliability of deliveries, VP3=More efficient store operation

**Figure 9. Matching of customer needs and value propositions for receivers**

**Transport providers**

The planning for TPs can be improved with more and earlier information through better transparency throughout the supply chain and improved reliability of deliveries. This can lead to **increased cost efficiency** due to more efficiently planned deliveries. Furthermore, by avoiding inefficient last mile deliveries, TPs can also increase their cost efficiency due to shorter delivery routes, not being restricted to certain delivery times, and not having to adjust their vehicle fleet to comply with local requirements.

More **reliable deliveries** for TPs can be achieved by better transparency throughout the supply chain with for example earlier information. Improved reliability of deliveries evidently leads to more reliable deliveries. Avoiding inefficient last mile deliveries and dropping off the goods at the UCC are interpreted as more reliable deliveries due to more flexible deliveries and being less controlled by multiple delivery times.

**Urban transport providers**
If UTPs are used in a UCC system, they can have the opportunity to start a new business and thereby the potential to **generate revenue**.

**Authorities**
For authorities, to attain a more attractive city is one of the most important aspects to reduce the number of freight vehicles. **Reduce the number of freight vehicles in the urban area** and a more attractive city are almost the same thing, but with different names, and a match thus exists between the need and the value proposition.

**Residents**
For residents in urban areas a more attractive city is characterized by a **reduction in the number of freight vehicles**, in the same manner as for authorities, i.e. there is a match.

**UCC operator**
A private company operating a UCC is probably interested in **generating revenue**. If the UCC was not in the system before, a new business opportunity arises: open and operate a UCC.

**Property owners**
The arguments for authorities and residents can be used here as well. Property owners probably want their property to be as attractive as possible and one key can be to **reduce the number of freight vehicles**.

**Table 7. Summation of the relationships between customers needs and value propositions for the UCC customers**

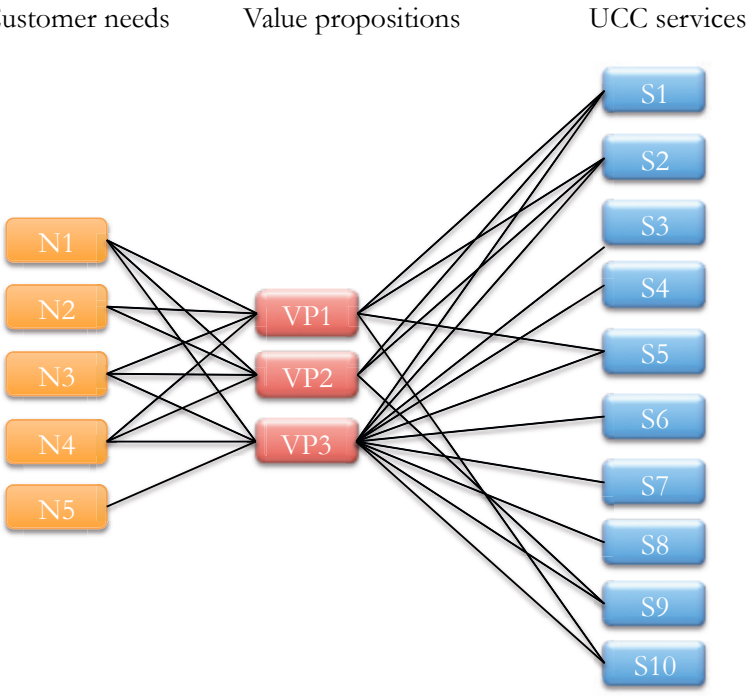
| Customer | Need | Value proposition |
|---|---|---|
| Suppliers | Increased cost efficiency | Better transparency throughout supply chain |
| | Reliable deliveries | Better transparency throughout supply chain |
| Receivers | Increased cost efficiency | Better transparency throughout supply chain, improved reliability of deliveries, and more efficient store operation |
| | Reliable deliveries | Better transparency throughout supply chain and improved reliability of deliveries |
| | Reduce disturbance of personnel | Better transparency throughout supply chain, improved reliability of deliveries, and more efficient store operation |
| | Provide high customer service | Better transparency throughout supply chain, improved reliability of deliveries, and more efficient store operation |
| | More storage | More efficient store operation |
| Transport providers | Increased cost efficiency | Better transparency throughout supply chain, improved reliability of deliveries, & avoiding inefficient last mile deliveries |
| | Reliable deliveries | Better transparency throughout supply chain, improved reliability of deliveries, & avoiding inefficient last mile deliveries |
| Urban transport providers | Generate revenue | New business opportunities |
| Authorities | Reduce number of freight vehicles in urban area | A more attractive city |
| Residents | Reduce number of freight vehicles in urban area | A more attractive city |
| UCC operator | Generate revenue | New business opportunities |
| Property owners | Reduce number of freight vehicles in urban area | A more attractive city |

## 5.4 Linking UCC services to customer needs

The matches between customer needs and value propositions have been presented in the last section. Sections 5.1 to 5.3 are viewed as pieces of the puzzle and in this part they are put together to fulfil the purpose of this thesis: to identify and describe the relationships between customer needs and UCC services.

This part is very similar regardless of the potential UCC customer. The idea is that the analysis and discussions of identified needs, UCC services, and value propositions are combined, i.e. linked together. The results presented here can thereby be traced to the other parts of the chapter. Since this part will be similar, regardless on the customer, an example is illustrated for one UCC customer group, receivers. As noted earlier, most of the needs, value propositions, and UCC services are directed towards receivers, thereby providing an incomplete picture of needs for all UCC customers. But receiver is a good group to illustrate the matches since they have the most connections and thereby provide a more comprehensive view.

**Receivers**
From research question 1, five needs were identified for receivers: increased cost efficiency, reliable deliveries, reduce disturbance of personnel, provide high customer service, and more storage. RQ2 provides examples of how value propositions and services can be mapped to each other. In RQ3, a proposition was made for how different value proposition can be matched to these needs. Figure 10 below shows these relationships together with all needs, value propositions, and UCC services. As can be seen, the total number of connections is very large. The figure is only used to illustrate how connections might look and the complexity.




N1=Increased cost efficiency, N2=Reliable deliveries, N3=Reduce disturbance of personnel, N4=Provide high customer service, N5=More storage, VP1=Better transparency throughout supply chain, VP2=Improved reliability of deliveries, VP3=More efficient store operation, S1=Request delivery time, S2=Request delivery frequency, S3=Stockholding, S4=Pre-retail services, S5=Ordering process, S6=End customers can collects goods, S7=Waste and return management, S8=Home deliveries, S9=Quality and quantity check, & S10=Registration in computer system

**Figure 10. The relationship between potential customers' needs, value propositions, and UCC services for receivers**

Below is the need **increased cost efficiency** illustrated in Table 8 together with the value propositions and UCC services. The need is used to provide an example of how the relationships can look.

**Table 8. Illustration of the relation for the customer need cost efficiency**

| Need | Value proposition | UCC Service |
|---|---|---|
| Increased cost efficiency (N1) | Better transparency throughout supply chain (VP1), improved reliability of deliveries (VP2), and more efficient store operation (VP3) | Request delivery time and frequency, stockholding at UCC, pre-retail services, ordering process, end customers can collect goods at UCCs, waste and return management, home deliveries, quality and quantity check, and registration in computer system |

The receivers can benefit in multiple ways from using UCCs. Value propositions such as more efficient store operations can benefit them by enabling improvement of the planning of the workforce, possibility to increase their customer service, and providing them with new storage opportunities. These value propositions also have corresponding needs, which can result in receivers being able to perceive these value propositions and services as beneficial. Also, by illustrating the services and how receivers can benefit from using them, arguments can be provided for why they could be willing to use them and potentially also pay for them. Finally, by illustrating this, receivers from for example study C can hopefully see the bigger picture and be willing to participate in a UCC system.

**Other potential customers**
Authorities and residents both have a need to reduce the number of freight vehicles in the urban area. This corresponds to services such as use of environmentally friendly vehicles. As a result, a more attractive city area can be achieved. Transport providers (TP) may, for example, be interested in cost efficiency and reliable deliveries. By using UCCs, the TPs can improve their planning and not enter congested cities, and more visible delivery information can also improve their situation even more. UCC operators and urban transport providers (UTP) have the potential to generate revenue by starting up new businesses. Suppliers can also be interested in cost efficiency, with reduced operation cost due to shorter delivery routes, i.e. the total cost for suppliers can be reduced. Property owners can be interested in reducing the number of freight vehicles around their building, and services such as consolidation have the opportunity to achieve this.

## 5.5 Identified gaps

In the section above and in research question 3 only the matches between needs, value propositions, and UCC services are presented. However, three types of gaps have been identified: when a value proposition exists by no corresponding customer need, when UCC services exist but without a corresponding gap, and if a customer need exists but no corresponding value proposition.

### 5.5.1 Value propositions, no corresponding need
One of the most interesting value propositions without a need is logistics knowledge. As noted earlier, an important step is to extend the scope of potential UCC customers. To attract new customers, it is important to also show how they can benefit from using UCCs. Having logistics knowledge within the UCC organisation can be an enabler to identify new potential UCC services and value propositions, but it can also lead to better understanding of a potential customer's situation.

Another important value proposition is good publicity. This is probably seen as a need for multiple potential UCC customers, but is not explicitly stated in the studied UCC literature. This value proposition can potentially attract any company or authority if UCCs are viewed as an environmentally friendly solution. Examples from the Gothenburg case also show that the potential users do not have to be included in the UCC solution, i.e. not use other UCC services.

The UTP had three potential value propositions (better transparency throughout supply chain, improved reliability, and route planning) without corresponding needs. These are worth noting since they can probably make planning easier for the UTP. For receivers, they can also benefit from a more attractive city with fewer freight vehicles parked around their display windows.

### 5.5.2 UCC services, no corresponding value proposition

From the net list of UCC services presented in research question 2, one service was not mapped to any value proposition: charging stations at UCCs. The service has the potential to attract customers and thereby be mapped to value propositions. This should not be viewed as contradictory but rather seen as an indication that the research field is growing. And by identifying new services, sometimes specific to certain situations (e.g. in the Eskilstuna case), the list of how potential UCC customer can benefit can grow and thereby potentially identify and attract new customers.

### 5.5.3 Customer needs, no corresponding value proposition

This gap was not identified in the analysis and discussion but may probably exist and occurs when there is a customer need but the UCC cannot offer any services to meet the need. In that case, new services might be needed, i.e. service innovation.

# 6 Conclusions and Future Research

*The conclusions summarize the findings from the analysis and discussion. The chapter also addresses contributions to both research and practice. The last part of the thesis presents some reflection on future research.*

## 6.1 Conclusions

This thesis provides illustrations of how the needs of UCC customers can be matched to UCC services. First of all, in the thesis a number of customer needs have been identified. As previous UCC literature has pointed out, most of the needs can be found in the customer group receivers and the findings from the thesis support this. The thesis identifies five different customer needs for receivers: increased cost efficiency, more reliable deliveries, reduced disturbance of personnel, provide high customer service, and more storage. The customer groups supplier and transport providers have two identified needs each: increased cost efficiency and more reliable deliveries. The remaining customer groups (urban transport providers, authorities, residents, and property owners) have one identified need each. The UCC operator has generate revenue as the identified need.

A total of 16 different services from the literature and the studies included in this thesis are identified. The studies expanded the list with three new services: e-commerce with used products, advertisement, and registration in computer system. The services are examples from different cases; however, all of them can be viewed in a larger context and can thereby be used in other contexts as well. The value propositions that UCC services can lead to are also presented, and the mapping of UCC services to value propositions also shows that the receiver group is the most studied one and has the potential to use most services. The mapping itself provides examples of how different value propositions can relate to UCC services, i.e. which UCC services may be needed to contribute to value propositions.

The thesis also provides a basis for how customer needs can be matched with value propositions from UCCs. One example among the identified matches is the need for more reliable deliveries for transport providers, and the matching value propositions avoiding inefficient last mile deliveries and better transparency throughout supply chain. Through the matching, potential indirect effects have been identified. In the example above, indirect effects include more flexible delivery times. The thesis also illustrates the relationships by connecting customer needs to UCC services.

This study has provided a basis for identifying and describing relationships between the needs of UCC customers and services that UCCs can provide. The results of the matches provide an illustration, and also which UCC services can be needed in order to fulfil customer needs. Furthermore, identifying value propositions and the benefits they can lead to can function as an understanding of, or arguments for, why stakeholders should be part of a UCC system, i.e. become UCC customers.

Not surprisingly, the receiver of goods is the customer group that could receive the most benefits from using UCCs. By matching needs with UCC services, a total of five needs, three value propositions, and ten UCC services have been identified and connections between them have been illustrated. The needs include, for example, increased cost efficiency while services include pre-retail services. Other customers such as property owners and transport providers also have the potential to benefit from using UCCs; neither the needs nor the value propositions, however, are as widespread as for receivers. The customer groups authorities and residents are important to mention because a UCC system is often introduced to improve the attractiveness of cities (i.e. reduce emissions, congestion, etc.), which has positive effects for authorities and residents. Even if their needs and corresponding value propositions are not as established as for receivers, they can nonetheless be the customer groups that actually benefits the most from a public perspective.

When providing a basis for understanding the relationship between customer needs and UCC services, matches are evidently highlighted. Despite this, a number of gaps were also identified: when value propositions existed, but no corresponding need; when a UCC service did not have a corresponding value proposition; and when a customer need did have a corresponding value proposition.

The study also highlights the value propositions logistics knowledge at the UCC and good publicity as two important but overlooked propositions. Both can be very important to attract new potential customers, which can lead to revenue to UCCs.

## 6.2 Contributions to research

This thesis contributes mainly to the UCC literature and the research area city logistics. First of all, the contribution to the UCC literature includes enlarging the scope of potential UCC customers; not only view the receiver of goods as the customer. Previous research has focused on the receivers and potentially missed other potential customers, thereby also missing potential revenue streams to the UCC. By viewing every stakeholder that can be positively affected by a UCC as customers, new opportunities arise to expand the UCC operations, attract new customers, and create more revenue streams. The authorities, for example, are often a financial contributor to UCCs through subsidies. This, however, is not seen as a sustainable route. By changing the view of authorities from benefactors to customers, arguments such as a more attractive city can be provided and hence why they should be customers of UCCs.

Secondly, the thesis contributes to the UCC literature by identifying three types of services: advertisement, e-commerce with used products, and recording in computer system. All of these can probably be viewed in a larger context and may thereby also be applicable in other contexts.

The thesis also provides a basis for how the relationships between customer needs, value propositions, and UCC services can look. These relationships can be viewed as arguments for why different stakeholders should participate in a UCC system.

Viewing all stakeholders as potential customers can also have implications for city logistics in general. Other types of initiatives have shown similar tendencies as UCCs to have problems to generate revenue. Also, within both UCCs and other city logistics initiatives, different stakeholders often see initiatives as obstructive. By enlarging the customer scope and including all stakeholders, their perception might change if benefits associated with UCC are highlighted.

## 6.3 Contribution to practice

This thesis contributes to practice by highlighting different potential customers and their potential needs. Viewing all stakeholders as customers shows that every stakeholder can join or participate in a UCC system, not only receivers and the UCC operator. Furthermore, enlarging the scope of customer needs and viewing stakeholders' problems as needs may lead to identifying needs they were previously unaware of. This further points to the importance of knowing who your customers are and understanding their situation.

By identifying relationships between customers' needs and value propositions, and thereby providing arguments for why stakeholders should participate in a UCC system can also have implications for the financial aspect. One of the points of departure of this thesis was the financial viability of UCCs. If it is possible to illustrate how different stakeholders can benefit from the using of UCCs, their willingness to participate and pay might increase. Attaining financially sustainable UCCs has the potential to improve the city environment with fewer freight vehicles and use of environmentally friendly, e.g. electric, vehicles. This can have positive effects on the environment, among other things through reduced emissions, less traffic congestion, and lower energy consumption.

## 6.4 Reflections on future research

This study has strived to provide a basis for customer needs and UCC services by examining the positive side of UCCs. Even if this is an important first step, future research should also take the negative aspects into account. By taking both the positive and the negative sides into account, some type of net outcome can be provided. Through investigating this aspect, clear arguments can be provided for why certain customer groups should be involved in a UCC system, and others should not. Furthermore, by also showing how different customers can benefit, arguments can also be made for why certain customers should be part of the financing of a UCC system.

Mainly two of the elements of the business model have been in focus in this thesis: value propositions and target customers. One important part when it comes to business models is to consider all elements and their relationships. This thesis provides a basis for how value propositions and target customers can interoperate, but future studies should consider all elements and investigate how they relate. Related to this, in order to fully understand UCCs' potentials, future research should apply the whole business model and evaluate it.

To further understand what type of value UCCs can provide for its customers, it is also important to investigate what value the customers expect and how it can be created. This study aimed to identify the benefits, but quantifying them in some way can further reinforce the arguments for why they should be a part of a UCC system. One example of this is that by introducing key performance indicators, which can be used to illustrate a possible improved city environment, local authorities might be willing to pay to maintain such benefits. Also, by investigating the potential value all UCC customers can obtain; future studies should also investigate how this value can be related and transformed into revenue for UCCs, which could grant long-lived UCCs.

The third identified gap in the analysis and discussion (customer needs but no corresponding value proposition) indicates that service innovation can have an important role, in order to fulfil the needs of the customers. Understanding the problems and needs of the customers, and thereby offering new/other types of services, can attract new customers and also maintain the current ones. Future studies should address service innovation from a UCC perspective.

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