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Customer Benefits in City Logistics

Towards Viable Urban Consolidation Centres

Henrik Johansson

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Henrik Johansson

2020

Logistics and Quality Management
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This work is a continuation of my licentiate thesis, Urban Consolidation Centres – On Relationships between Customer Needs and Services in City Logistics (Licentiate thesis No. 1800, Linköping Studies in Science and Technology)

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Abstract

Urban Consolidation Centre (UCC) is a city logistics initiative that has the potential to increase the efficiency of urban freight delivery systems while reducing negative environmental and social effects caused by freight vehicles. One important issue that have hindered longevity of this initiative is its viability, both the financial viability and acceptance from affected stakeholders (also called UCC customers). The UCC customers in focus in this thesis are receivers of goods and municipalities. To satisfy both types of stakeholders, their requests and, in particular, the benefits they can gain from using UCCs need to be studied. The types of benefits to be given priority differ between the stakeholders, where municipalities strive towards more societal benefits, and the main goals of receivers are an increase in efficiency and financial sustainability. In response, the purpose of this thesis is to deepen the understanding of benefits for customers of UCCs, with a particular focus on customer needs and benefits that UCCs can provide.

This thesis consists of five appended papers, each of which uses a different methodology. The methodologies applied in the papers include a multiple interview study of five UCCs, a survey-based interview study of retail stores, and a case study of an operating UCC. Regarding customer needs, this thesis takes the customer perspective, in order to identify needs that UCCs can meet. The results presented in this thesis also highlight the importance for UCCs to give priority to meeting customer needs that stem from some type of problem. Regarding benefits that UCCs can provide, the thesis suggests how different types of benefits can be distinguished. This can give guidance to UCC operators regarding which benefits should be given priority in communication with UCC customers. However, the results highlight that it is also important to understand the situation of the customer to be able to communicate the most relevant benefits that UCCs can provide. Furthermore, the results illustrate different improvement areas that can affect the benefits for UCC customers. These identified areas are: improved understanding by both UCCs and its customers of each other's operation, communication, developing a more holistic view for UCC customers, and developing new UCC services to match customer needs.

The results provide a foundation for customer needs that UCCs can meet, and the benefits that UCCs can provide. This foundation can be important for UCC customers to gain a better understanding of what a UCC is and how it can affect their operation, something that this thesis contributes towards. It can also assist initiators of UCCs to determine which customer needs they should focus on. Lastly, the results and contribution also address the potential role of municipalities, and it is argued that their role should change from a more supportive role to that of a paying UCC customer. All of these aspects can increase the probability that a UCC, when established becomes viable.

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So, here it is, my doctorate thesis, something that sometimes felt a million miles away. It would be a lie to say that the process has always been easy. The road has had its ups and downs and I have sometimes struggled to find my way forward. But, here it is! Despite the struggles, my journey has been wonderful, rewarding, and I have developed so much during it. Even though only my name is on the front page, there are many people who have had significant impact on the work. I can honestly say that this thesis would not have been possible without these people. There are a few that I would like to give extra credit to, even if there are more people than the ones I mentioned here who have been important along the way.

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Linköping, 18 Mars 2020

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List of Appended Papers

Paper I

Björklund, M. & Johansson, H. (2018). “Urban consolidation centre-a literature review, categorisation, and a future research agenda”, *International Journal of Physical Distribution & Logistics Management*, 48(8), 745-764.

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. & Björklund, M. (2017). “Urban consolidation centres: retail stores’ demands for UCC services”, *International Journal of Physical Distribution & Logistics Management*, 47(7), 646-662.

Paper IV

Björklund, M. & Johansson, H. (2018). “Designing a business model for redistribution of surplus food”. *Book of proceedings*, presented at NOFOMA conference 13-15 June 2018, Kolding.

Paper V

Johansson, H. (2019). “Case report – A study on Eskilstuna’s transshipment centre from two perspectives”. *Case report*, unpublished.

Author's Contribution to the Papers

Paper I

The two authors of the paper contributed equally to the research idea, research design, data collection, analysis, and developing the paper during the review process.

Paper II

The author of this thesis contributed to updating the frame of reference and participated in two of the interviews. In addition, the author also contributed during the analysis and with developing the paper during the review process.

Paper III

The author of this thesis had a significant role in formulating the research idea, research design, and during the data collection. Both authors of the paper contributed equally during the research analysis, and developing the paper during the review process.

Paper IV

The author of this thesis contributed to the data collection and took the lead in the data collection related to benefits and value. The author took a more supportive role during the research design, analysis, and developing the paper during the review process.

Paper V

The author of the thesis was responsible for the research idea and research design. The author also took the lead during the empirical data collection and was responsible for the analysis.

1 Introduction

The first section in the introduction addresses city logistics in general, why the subject is important, and the problems that surrounding it. The subsequent section presents a potential solution and the focus of this thesis, namely Urban Consolidation Centres (UCC). This is followed by a description of how customer benefits can be used in a UCC context. The section also addresses two main concepts of this thesis: customer needs and the benefits that UCCs can provide. The chapter ends with a description of the purpose of this thesis and the research questions the thesis addresses.

1.1 Why city logistics is important

Urban areas in the world are growing. It has been calculated that more than 50 % of the world's population is living within urban areas (Browne *et al.*, 2019). In itself, this may not be a problem, but a constant flow of goods is needed to achieve vibrant and prosperous cities (Quak *et al.*, 2014). The freight deliveries that are a necessity for every city bring with them many negative effects, including traffic congestion, queues at loading docks, and the occupation of kerbside space (van Rooijen & Quak, 2010; Allen *et al.*, 2014). These effects do not only make the freight distribution more inefficient, but are also detrimental for the people who live in the cities. Another factor is the presence of several independent logistics service providers (LSPs) in cities (Allen *et al.*, 2018). Different LSPs drive on the same streets and deliver to the same addresses, which further makes the distributions more inefficient.

Freight transports in cities has many negative effects also from an environmental and social points of view, in addition to those for LSPs and the city inhabitants. Emissions, including CO₂ emissions, are often mentioned, since they harm not only the people who live in cities, but also the planet, through such effects as global warming (Taniguchi & Thompson, 2014; McKinnon, 2015). Energy consumption is another factor worth noting, where the use of energy in the freight sector has increased more than in other sectors in the EU (EEA, 2019). Other negative effects include noise, and an increased risk of accidents (Benjelloun *et al.*, 2010; Lin *et al.*, 2016). The above-mentioned effects are already noticeable, and are expected to increase as the number of people living in cities increases. Trends such as increased e-commerce are another factor that may lead to an increased number of freight deliveries (Cherrett *et al.*, 2017). The current global warming and increasing inefficient freight delivers, together with more stringent environmental goals from bodies as the European Commission (such as to reduce CO₂ emissions by 80 % before 2050, European Commission, 2017) points to the need for actions.

The distribution of goods is one activity that is often included in logistics management, which also includes activities such as transports, storage, and management of products through supply chains together with how activities can be planned and implemented (Lambert *et al.*, 1998). When addressing how the environmental effects of logistics activities can be reduced, the term “green logistics” is commonly used (McKinnon, 2015). Furthermore, McKinnon describe city logistics, i.e. freight deliveries in urban areas, as one part of green logistics. City logistics can, for example, be described as the process of optimising logistics activities using advanced information systems (Taniguchi *et al.*, 2001). Lindholm (2012) described it as the movement of goods and service transports, in, out or within cities. A third description was given by Awasthi and Chauhan (2012), in which they highlight activities related to logistics management within cities. In this thesis, the term “city logistics” is used in a similar vein to that used by Awasthi and Chauhan. Their definition of city logistics is:

“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. 574)

Activities related to urban freight distribution affect cities and their inhabitants in a number of negative ways, but the movement of freight is necessary for prosperous cities (BESTUFS, 2007; Allen *et al.*, 2015; Nordtømme *et al.*, 2015). This creates the need to find alternatives to the current design of freight distribution. Thus, initiatives in city logistics should reduce negative environmental and social effects, while at the same time enabling more efficient distribution (Crainic *et al.*, 2009; Benjelloun *et al.*, 2010). Initiatives in city logistics that aim to improve city environments are nothing new, and several different initiatives have been tested throughout the years (Browne *et al.*, 2005; Muñuzuri *et al.*, 2005). These are, for example, off-peak deliveries (Holguín-Veras *et al.*, 2011), parcel pack stations (Quak *et al.*, 2014), and consolidation terminals (Browne *et al.*, 2005).

The use of Urban Consolidation Centres (UCC) (a type of consolidation terminal) is a city logistics initiative that has been studied more than others (Benjelloun *et al.*, 2010; Lagorio *et al.*, 2016). It is recognised that it would be beneficial for urban distribution to have some form of decoupling point between the long regional transports and the shorter delivery transports within urban areas (European Commission, 2007). The report from EC also states that the use of a decoupling point can make it easier to perform deliveries with more environmentally friendly vehicles. A UCC is one way to achieve a decoupling point (van Rooijen & Quak, 2010). UCCs may reduce negative social and environmental effects while making the distribution system more efficient (BESTUFS, 2007; Allen *et al.*, 2012). Thus, UCCs can not only improve the efficiency of transports but also reduce the negative effects from freight vehicles, and will therefore be the focus of this thesis.

1.2 A potential solution: Urban Consolidation Centre

One of the more widely used descriptions of UCC is provided by Browne *et al.* (2005), where they describe it as:

“A UCC is best described as a logistics facility that is situated in relatively close proximity to the geographic area that it serves be that a city centre, an entire town or a specific site (e.g. shopping centre), from which consolidated deliveries are carried out within that area.”

(Browne *et al.*, 2005, pg. 4)

Figure 1 below illustrates an example of how a distribution system with a UCC, and a more traditional distribution system without a UCC.

Figure 1. A distribution system without a UCC and one with a UCC

UCCs are based on the idea that LSPs deliver goods to UCCs, where the goods is consolidated and then distributed to receivers in urban areas. The distribution is often carried out by personnel from UCCs or by separate transport providers (Browne *et al.*, 2005). One important difference between UCCs and warehouses or terminals managed by an LSP is that the transports that deliver in the urban area contain goods from different LSPs (Benjelloun & Crainic, 2009). One major benefit of the use of UCCs is that a higher load factor on the distribution vehicles can be achieved, due to the close proximation of UCCs' receivers (Browne *et al.*, 2005). This is also one of the main reasons for introducing UCCs: to avoid half-empty freight vehicles entering urban areas (Allen *et al.*, 2012), something that is commonly termed the 'the last mile problem'. This gives a higher fill rate which can reduce the number of freight vehicles that operate within urban areas. This, in turn, can reduce the previously mentioned negative effects.

Since UCCs are a type of terminal, several resources must be available for them to be operating, and these resources cost money (Browne *et al.*, 2005; van Rooijen & Quak, 2010;

Aastrup *et al.*, 2012). The expenses include start-up costs and rent (Browne *et al.*, 2005; Nordtømme *et al.*, 2015; Lin *et al.*, 2016), the purchase of delivery vehicles, and the salary of personnel (Browne *et al.*, 2005; Nordtømme *et al.*, 2015), and other resources related to such as, electricity (Lin *et al.*, 2016).

1.2.1 UCC services

UCCs can offer many different types of services in addition to distribution (Browne *et al.*, 2005; van Rooijen & Quak, 2010; Aastrup *et al.*, 2012). The distribution service comprises the transport of goods from UCCs to receivers in urban areas. Other type of services (known as “value-added services”) include storage, price-tagging of products, and unpacking of larger consignments (Browne *et al.*, 2005; Aastrup *et al.*, 2012). Several terms are used to denote these types of services; value-added services and retail services (Browne *et al.*, 2005), extra services (van Rooijen & Quak, 2010), and 3PL services (where “3PL” is an abbreviation for “third-party logistics”) (Aastrup *et al.*, 2012). The term **UCC service** will be used in this thesis to denote transport services and other types of services.

1.2.2 UCC customers

The UCC services can be targeted at different stakeholders, who may be interested in different services. For example, relevant UCC services for receivers of goods are mainly distribution, stockholding, unpacking of larger consignments, and price-tagging of products (Browne *et al.*, 2005; Aastrup *et al.*, 2012). These are services that simplify the daily operation for receivers. Receivers may be commercial businesses such as retail stores, or municipal receivers such as schools and offices (Björklund & Gustafsson, 2015).

Municipality organisation (hereafter named municipality) is another type of stakeholder and is responsible for the interests of local society. The UCC services they require and the desired outcome from these services differ from those required by receivers. One important goal for municipalities is to create a well-functioning and attractive urban area (Björklund & Gustafsson, 2015). This means that an outcome such as a reduction in the number of freight vehicles in the urban area is very important for them. Other stakeholders in the provision of city logistics include suppliers of goods, LSPs, and residents.

The services that UCCs can offer are often viewed as a way for UCCs to generate revenue, i.e. offering services that stakeholders are willing to pay for (Browne *et al.*, 2005; van Rooijen & Quak, 2010; Aastrup *et al.*, 2012). When stakeholders use a UCC service, they are customers of the UCC. In general, every stakeholder that can benefit from the use of UCCs is a potential **UCC customer**.

1.2.3 Viable UCCs

Similar to almost all types of business, the cost for operating UCCs must be balanced by a source of income for successful long-term operation (Janjevic & Ndiaye, 2017). The main

type of financing of UCCs has been in subsidies from primary municipalities (Browne *et al.*, 2005; Allen *et al.*, 2012; Ville *et al.*, 2013). One problem with this type of financing is that UCCs come to rely on these subsidies (Allen *et al.*, 2012). Subsidies are usually time-limited, and UCCs have in the past lost their main source of revenue when the subsidies end, and been forced to shut down (Browne *et al.*, 2005; Ville *et al.*, 2013). In other words, UCCs have usually failed to create enough revenue themselves; the operations have not been considered to be sustainable and the initiative terminated (Janjevic & Ndiaye, 2017). The financial viability is one significant issue, but also its viability in general. Something is **viable** if it is capable of working or has a reasonable chance of succeeding (Oxford Dictionary). In other words, to be viable, a UCC must satisfy more than just the financial factor. Another factor that is required for viable UCCs is acceptance from the stakeholders affected, which can also affect their willingness to contribute financially to UCCs.

It is important to consider two components with respect to financing; the benefits that companies offer to their customers (also referred to as “value propositions”), and the needs of those customers (Zott & Amit, 2010; TURBLOG, 2011; Malhene *et al.*, 2012; Quak *et al.*, 2014). **Customer benefits** that a company provides are important, since the company is targeting the customers, and the benefits it provides may be the reason that customers choose a certain supplier (Osterwalder & Pigneur, 2010). It is also important to address **customer needs** since it is these needs that suppliers aim to meet (TURBLOG, 2011). A customer need may be expressed by the customers or it may be something that is viewed as a problem (TURBLOG, 2011). Customer benefits and customer needs can also be viewed in the context of UCCs. The main potential source of income for UCCs is payment for services, and thereby potential benefits, that they offer. UCC customers will only be interested in the benefits if they fulfil a customer need. In other words, customer needs must match the benefits offered by UCCs if both sides are to be satisfied. This aspect is somewhat lacking in the UCC literature, where customer needs are rarely studied and the customers’ perspective is often missed (van Rooijen & Quak, 2010; Gammelgaard *et al.*, 2016). Thus, one important step is to study customer benefits in greater depth.

1.3 Benefits from UCCs

It is widely recognised that businesses must offer benefits to customers to attain long-term profitability (Porter, 1996; Cravens *et al.*, 1997; Woodruff, 1997). Studying the benefits that customers can gain may enhance the understanding between the business and its customers (Ulaga, 2003). The term **customer benefits** can mean almost anything depending on the situation, and it has been defined broadly as “*an advantage or profit gained from something*” (Oxford Dictionary). Homburg *et al.* (2005) define it as positive consequences from a relationship between a supplier and a customer. In a UCC context, this relationship arises when a UCC customer uses a UCC service, and in this case a customer benefit is a positive outcome from using UCC services.

Some of the benefits that UCCs can provide are mentioned above, and some benefits are more important for certain UCC customers. For example, benefits that are related to the actual distribution of goods, such as more reliable delivery times, are directed mainly to receivers of goods (Aastrup *et al.*, 2012). Other types of benefits for receivers include an improvement in the working environment or freeing up of time for personnel (Gammelgaard *et al.*, 2016). Some benefits of UCCs instead target municipalities, i.e. **societal benefits**. Examples of these include reducing the number of freight vehicles in urban areas, and increasing safety around schools (Browne *et al.*, 2007; Björklund & Gustafsson, 2015).

UCCs is often viewed as an initiative that can provide benefits for most stakeholders (Browne *et al.*, 2007), but negative consequences may also arise. Nevertheless, this thesis focusses on the positive side, i.e. the benefits for customers. The benefits that customers obtain from UCCs are poorly understood and have not been studied sufficiently (Gammelgaard *et al.*, 2016). Furthermore, UCCs can achieve economies of scale by performing activities that are directed at multiple customers (see e.g. Aastrup *et al.*, 2012). Consequently, the total cost for UCCs and receiver can be reduced (Browne *et al.*, 2005; Aastrup *et al.*, 2012). Nevertheless, this thesis contributes towards development of viable UCCs and mainly focusses on the customer benefits, since this has received less attention in previous research. Furthermore, UCC systems where the municipality has a significant role are subject to other types of evaluation (Björklund & Gustafsson, 2015). For example, a municipality may decide that achieving a more attractive city with fewer freight vehicles is worth paying for.

As previously noted, any stakeholder that can benefit from a UCC is potential customer. However, this thesis focusses on two potential customers: receivers of goods and municipalities. Receivers (both private and public) are considered to be the stakeholder that can benefit the most from using UCCs, and are thus potentially the main source of income for UCCs (van Rooijen & Quak, 2010; Aastrup *et al.*, 2012). Municipalities are responsible that society functions satisfactory (municipalities aim for societal benefits), and are thus responsible for attractive urban areas. For them, a reason for introducing UCCs is to reduce the number of freight vehicles. Furthermore, municipalities have previously played an important role in the financing of UCCs, through subsidies (see e.g. Ville *et al.*, 2013).

1.4 Purpose and research questions

Previous research has examined issues that are important when establishing viable UCCs, and shown that lack of financial viability and lack of acceptance from stakeholders are two major concerns. The scarcity of long-term success for UCCs suggests that it is necessary to broaden the focus when studying benefits for customers. It is necessary, for example, to use the customers' perspective and study what types of benefits they obtain. Increasing customer benefits can increase the likelihood that customers will be willing to pay for

UCCs. Two important concepts to include when studying benefits for customers are customer needs and benefits that UCCs can offer. Addressing these concepts can shed light on some of the issues that have previously been identified as obstacles to viable UCCs. This leads to the following formulation of purpose of this thesis:

The purpose is to deepen the understanding of benefits for the customers of UCCs, with a particular focus on customer needs and benefits that UCCs can provide

To be able to fulfil the purpose, three research questions will be answered. The first research question addresses customer needs. The focus on customers has in general been lacking, and thereby also their needs. A customer perspective is important in the knowledge required to create viable UCCs. One important step is to study which needs can exist. It is also important to consider aspects such as which needs are the customers aware of, which latent needs can exist, and how needs can be categorised. Answering these questions increase the knowledge, and makes it possible to further describe and understand customer needs. The first research question is:

RQ1: How can customer needs be described and understood?

A second important topic are the benefits UCCs can provide Just as for customer needs, several aspects can be used to describe and understand customer benefits. For example, which benefits can UCCs provide, and how they can be categorised. Customer benefits have been previously studied, but not in enough detail. A deeper understanding is needed to relate customer benefits to the emergence of viable UCCs. This leads to the second research question:

RQ2: How can customer benefits from UCCs be described and understood?

The first two research questions concern customer needs and the benefits UCCs can provide. A further component of the knowledge of how to attain viable UCCs also relates to customer benefits and how these can be increased (while focussing on customer needs and benefits that UCCs can provide). Ways to increase customer benefit may be directed at both UCCs and UCC customers. Increasing customer benefits can, in turn, increase the customers' acceptance and their willingness to pay for them. The third research question is formulated as:

RQ3: In what ways can customer benefits be increased?

1.5 Structure and outline of the thesis

This thesis is a compilation thesis and consists of a thesis frame and five publications that are appended. The publications consist of four published papers and a case report. The thesis frame has an analysis that differ, compared to the analysis in the publications. This analysis in the thesis frame is presented in Chapter 5, which uses two frameworks developed for this thesis that are presented in Chapter 2. The thesis frame (Chapters 1 through 6) can be read without the appended publications, but they provide more detailed descriptions and in-depth results. The papers are three journal articles and one conference paper, while the case report has not previously been published.

The second chapter of this thesis presents the frame of reference. The two first sections define important concepts in this thesis, namely, customer needs and customer benefits. Both customer needs and customer benefits are described in general and in the context of UCCs. The chapter ends with two proposed frameworks that are used for the analysis, based on the presented frame of reference.

Chapter 3 presents the methodology of this thesis. It describes the research approach used to formulate the purpose and research questions. The chapter also describes the research process, and the components that comprise the thesis. The research design is subsequently presented for all components. The last part of the chapter reflects on methodology, and discusses certain choices and their effect on the results.

Chapter 4 summarises the four published papers and the case report that are appended in this thesis. The chapter also specifies how each publication contributes to the analysis in this thesis. The final section shows to what degree the publications are used in answering each research question.

The fifth chapter presents the analysis and discussion of this thesis. The first three sections address the three research questions respectively. The analysis of both the first and second research questions consists of a part in which all identified needs and benefits are described in more detail. These sections end with a discussion that gives a broader picture. The chapter ends with a reflection over the analysis.

The last chapter presents the results from the analysis. The findings made while answering the research questions and the purpose are first presented. They include the identified needs and benefits, together with areas identified that can increase customer benefits. The implications for research are then described, followed by managerial contribution. The last section of the thesis presents several suggestions for future research that are related to this thesis.

2 Frame of Reference

This chapter presents the frame of reference and describes important concepts of this thesis. The two following sections describe customer needs and customer benefits in greater detail. Both sections present first a more general description, and then view each concept in a UCC context. The last section describes the proposed frameworks, in which the more general descriptions of customer needs and customer benefits are applied to a logistics context. The frameworks are later used in the analysis of this thesis.

2.1 Customer needs

Something that customers request or something that solves a problem can be called a customer need. For suppliers to provide some type of value, it is important to solve customers' problems, satisfy their needs, and identify their wishes (TURBLOG, 2011). A customer need may be something of which the customer is aware of, or it may be something about which the customer has not thought of (also called "latent need") (Matthing *et al.*, 2004). Meeting customer needs can be valuable for the customers and this is something that suppliers prioritise (Osterwalder & Pigneur, 2010).

Customer needs can be very diverse and widespread, and categorising them into different groups can make them more comprehensible (Lovelock, 1983; Urwiler & Frolick, 2008). In particular, categorisation of needs makes it easier to understand them from a supplier perspective (Urwiler & Frolick, 2008; Solomon, 2010). Furthermore, it also make it easier to understand the customers (Lovelock, 1983). Customer needs can be categorised on a scale that ranges from utility at one extreme, to psychic needs at the other extreme (Groth, 1994; Khalifa, 2004). Both Khalifa (2004) and Groth (1994) note that benefits for customers can accumulate when psychic needs are satisfied, beyond what is possible when only utility needs are satisfied. However, utility needs are, in most cases, very important for a business to function, so it is probable that these must be meet before satisfying other types of needs. Categorising needs also makes it easier for suppliers to set priorities when deciding which needs to target (Solomon, 2010).

Utility needs depend on the situation. They are, however, very concrete, non-emotional, and the minimum that is needed for something to work (see e.g. Khalifa, 2004; Solomon, 2010). Everything more than strictly utility needs has an (larger or smaller) aspect of psychic needs (Groth, 1994). As the name suggests, psychic needs are usually affected by human emotions and feelings (Solomon, 2010), and this mean that they depend on the customer. Examples of how to meet psychic needs (to satisfy the needs from a supplier perspective) are adding favoured attributes to the product or service, removing distracting attributes, and educating the customer (Groth, 1994).

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In a UCC context, the same description of customer needs can be used, i.e. needs can be something that customers describe explicitly or be related to problems that customers have. The UCC customers studied in this thesis have widely different needs since the goals are different. The main goal of receivers is often to ensure that their operations function well, generate revenue, and provide customer service (OECD, 2003; Aastrup *et al.*, 2012). The goals of municipalities include creating an attractive city in which transports in general functions efficiently (Quak & Tavasszy, 2011). It is further important for municipalities that they achieve their goals in a reasonably cost-efficiently manner (Björklund & Gustafsson, 2015).

The needs of receivers can be specified in greater detail. Almost any business must receive deliveries, and it is important that they are reliable (Browne *et al.*, 2005; Paddeu, 2017). Receiving deliveries is one type of potential customer need, and reliable deliveries is another type of customer need. Receiving deliveries are needed for most types of receivers, including retail stores and offices (Browne *et al.*, 2005). Unreliable deliveries, in regards to time, can often lead to problems for receivers and cause uncertainties that affect their planning of personnel and activities (Quak & Tavasszy, 2011; Gammelgaard *et al.*, 2016). Furthermore, it has been noted that personnel at receivers can be disturbed when deliveries arrive, especially if they are otherwise occupied (Quak & Tavasszy, 2011; Aastrup *et al.*, 2012). A customer need that can reduce the disturbance is the ability for receivers to request delivery time. Receivers also need an efficient way to handle waste and returns (van Rooijen & Quak, 2010) and this can thereby be viewed as a need. Waste is something that most businesses need to deal with, and handling returns is mainly a need for retail stores (see e.g. Aastrup *et al.*, 2012). This need was, for example, expressed by a majority of retail stores in a study in Copenhagen (Aastrup *et al.*, 2012).

Another type of need that is common in a UCC context is the need for external storage (van Rooijen & Quak, 2010). Receivers can use such storage to gain extra storage space or to ensure a more even distribution pattern (i.e. the external storage is used as a buffer if needed) (Gammelgaard *et al.*, 2016). Related to this, the use of external storage often requires an inventory system and such system can improve the traceability of products (Aastrup *et al.*, 2012). Another customer need that are affected by most of the already mentioned ones, is for receivers to provide customer service to their customers (Browne *et al.*, 2005; Aastrup *et al.*, 2012). This is very important since it also ties together with profitability of businesses (OECD, 2003; TURBLOG, 2011). Altogether, most of mentioned customer needs contribute to more efficient operation, and the ability to generate revenue.

The needs of municipalities can also be specified in greater detail. An attractive city, for example, is one in which fewer freight vehicles drive, with fewer freight vehicles parked in public spaces, and with less noise disturbance from freight vehicles (Browne *et al.*, 2007;

Quak & Tavasszy, 2011; Ballantyne *et al.*, 2013). An attractive city is the responsibility for municipalities and thereby viewed as a need for them. Another responsibility for municipalities is to reduce emissions and traffic congestion (Allen *et al.*, 2012; Awasthi & Chauhan, 2012), i.e. another need. Municipalities should also ensure the safety of its citizens. In this case, traffic safety related to freight vehicles (Björklund & Martinsen, 2014). Furthermore, the authors note that municipalities are responsible for traffic planning, which includes avoiding having freight vehicles parked on streets and avoiding queues at loading docks.

2.2 Customer benefits

The concept of customer benefits is used in almost every discipline, and its definition depends on what is studied. Customer benefits are the positive consequences of suppliers' actions. Customer benefits can be either benefits that customers perceive or benefits that suppliers intend to offer (see e.g. Osterwalder & Pigneur, 2010, and Khalifa, 2004). Categorisation of customer benefits is more common between disciplines, namely from tangible benefits to intangible benefits (Khalifa, 2004; Töytäri *et al.*, 2011). Just as the case of customer needs, customer benefits lie along a scale (see Khalifa, 2004). It can be more valuable for customers that suppliers offer benefits that include intangible components. Thus, it is possible for suppliers to increase the perceived benefits for customers by offering intangible benefits. Homburg *et al.* (2005) use the term 'add-on benefits' to describe intangible benefits, and note that such benefits can differentiate between suppliers.

The term "tangible benefits" is often used to described benefits that are concrete, and can usually be seen or measured (Mudambi *et al.*, 1997; Zaichkowsky *et al.*, 2010). Intangible benefits are more difficult to define, and are generally more 'soft' benefits. Levitt (1980) describe intangible benefits as hidden attributes that are added to a generic good or service that turn it into something extra for the customer. The author gives the example of a generic product from one company that can provide more benefits than products from competitors if the first company provides extra benefits. Homburg *et al.* (2005) note that extra benefits are usually not required, but they can be the reason that a certain supplier is chosen. The extremes of intangible benefits are often more difficult to grasp, and may contain an emotional component (Mudambi *et al.*, 1997).

Another way to distinguish between tangible and intangible benefits is that the former often included in the contract between suppliers and customers, while the latter are not (Fernandes, 2012). The reason is that intangible benefits are often difficult to formulate. It is worth noting that customer benefits can be viewed both from suppliers and from customers (see e.g. Mudambi *et al.*, 1997; Khalifa, 2004). This means that customer benefits for customers is the benefits they gain. For suppliers, customer benefits are the benefits they intend to offer.

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In a UCC context, customer benefits can be benefits that UCCs can offer to their customers, which in this thesis are receivers of goods and municipalities. Receivers are the customer group that can benefit the most from the use of UCCs (Browne *et al.*, 2005; van Rooijen & Quak, 2010). Municipalities on the other hand benefit from the creation of a more attractive city with fewer freight vehicles (Browne *et al.*, 2005; Nordtømme *et al.*, 2015). Such benefits for municipalities can be called societal benefits.

The delivery distances between UCCs and receivers are in general shorter compared to other distribution systems, and this may give several types of benefits to receivers. For example, the punctuality of deliveries can increase (Browne *et al.*, 2005). It is also often possible for receivers to request a specific time of delivery (Aastrup *et al.*, 2012). This is partly because UCCs can focus solely on the receivers and can adjust their operations to the requirements (Browne *et al.*, 2005; Aastrup *et al.*, 2012). Improved reliability and a more accurate time of delivery can reduce interruptions in the work of personnel at the receivers, and which makes planning easier (Browne *et al.*, 2005; Aastrup *et al.*, 2012; Gammelgaard *et al.*, 2016). This applies to both the planning of activities and of personnel. UCCs can also enable better information sharing which can give receivers better access to information, something that also can further improve planning of activities and personnel (Browne *et al.*, 2005; BESTUFS, 2007). Another potential benefit from the use of UCCs is that the same driver delivers the goods on several occasions, which may lead to improved perceived security for personnel at the receivers (Gammelgaard *et al.*, 2016).

Other types of benefits for receivers are mainly connected to the different types of UCC services that UCCs can provide (see examples in Browne *et al.*, 2005, Aastrup *et al.*, 2012, and in van Rooijen & Quak, 2010). Using external storage space at UCCs can give several benefits to receivers. Some of the storage space at the receivers' premises can be moved to a UCC. Receivers can use this space for other activities (Aastrup *et al.*, 2012; Lin *et al.*, 2016). The freed-up space can, for example, be used to increase the sales area (Browne *et al.*, 2005). Storage at UCCs can also be used during seasonal peak periods, and to increase the product assortment for receivers (Browne *et al.*, 2005; Aastrup *et al.*, 2012). Increasing product assortment is one way how customer service can be increased. Further, UCCs can offer an inventory system to keep track of products (Aastrup *et al.*, 2012). A UCC is a terminal, and thus some of the activities carried out at the receivers may be moved to UCCs. From a UCC perspective, this may lead to economies of scale, with resources being used more efficiently (Browne *et al.*, 2005). This may reduce the cost incurred by receivers. Activities that can be moved to UCCs include pre-retail services (such as unpacking larger consignments and attaching anti-theft devices), and shelf-stocking by personnel from UCCs at the store (Browne *et al.*, 2005; van Rooijen & Quak, 2010; Aastrup *et al.*, 2012). Moving such activities can give personnel at the receivers the time needed to offer better customer service (Browne *et al.*, 2005).

The main benefits for a municipality arise from the reduction in the number of freight vehicles, which can be achieved by using UCCs (Browne *et al.*, 2005; van Rooijen & Quak, 2010; Allen *et al.*, 2012). The benefits include a reduction in emissions, less traffic congestion, less noise, and a safer traffic environment (Browne *et al.*, 2005; BESTUFS, 2007; Aastrup *et al.*, 2012). UCCs also enable a shift to the use of vehicles more suitable for urban deliveries, i.e. smaller vehicles and possibly electrically powered vehicles (Browne *et al.*, 2005; van Rooijen & Quak, 2010; Björklund & Gustafsson, 2015; Lebeau *et al.*, 2017). This can further reduce emissions, noise, and energy consumption.

2.3 Proposed framework for analysis

Based on section 2.1 and 2.2 above, two frameworks are possible to propose that will be used for the analysis in this thesis. The general descriptions of customer needs and customer benefits are from multiple contexts. The frameworks need to be adapted to the studied context in order to use them. Since UCC is a logistics initiative, customer needs and customer benefits should be viewed in this context. Both frameworks will thereby be viewed from a logistics perspective.

2.3.1 Categorising customer needs from a logistics perspective

To reiterate, customer needs can be considered to lie on a scale that ranges from utility needs to psychic needs (Khalifa, 2004). Psychic needs have largely stemmed from branding literature, and areas where aesthetic components are important. Human emotions play a large role in those areas (see e.g. Khalifa, 2004; Candi & Saemundsson, 2011). Utility needs are more concrete and easier to understand, while psychic needs are more complex and subjective. This line of thinking can also be applied in business areas, however the emotional component is not as evident. Urwiler and Frolick (2008), for example, adopt a general categorisation of needs in a business context. They use the categorisation to describe different levels of needs in an IT system. Along the same line, this type of categorisation can be applied in logistics, where the general description of utility needs and psychic needs must be adapted to fit a logistics context. Figure 2 below shows the relationship between utility needs and psychic needs.

- **Mainly utility needs:** clear and concrete needs that are needed for a business to function. These needs can also be described as “logical needs”. They include (from a logistics point of view) the need to receive goods.
- **Mainly psychic needs:** needs that go beyond previous level. These needs can affect human emotions (but it is not a necessary condition). Needs in this category can also be viewed as improvements for businesses when adapting it to a business context. Improvements are usually not necessary but can make businesses function more efficiently. Meeting needs in this category is often viewed as something extra. Examples of psychic needs include, the need for increased job security, the need for stress reduction, and the need for personnel to feel more secure with knowing time of delivery.

Figure 2. The range of customer need from utility to psychic needs

2.3.2 Categorising customer benefits from a logistics perspective

Just as customer needs, the benefits that UCCs can offer can be placed along a scale (Khalifa, 2004; Homburg *et al.*, 2005). The provision of customer benefits within logistics is a common topic with examples such as benefits from distribution and storage. The framework still needs to be viewed in a logistics context, however, it is more straightforward than for customer needs. The extremes in the framework are tangible and intangible. The framework is illustrated in Figure 3 below.

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- **Mainly tangible benefits:** concrete benefits that are easy to follow up in some way. A basic tangible benefit from a logistics point of view is to receive deliveries. This is very concrete and easy to evaluate.
- **Mainly intangible benefits:** have a tangible component, but more ‘soft’ benefits are also included. Examples are meeting the same driver during deliveries, which makes the recipient feel more familiar and secure with the procedure.

Figure 3. The range of benefits from tangible to intangible benefits

3 Methodology

This chapter describes the methodology applied in this thesis and in the appended papers. The first section presents the research approach and addresses the formulation of the purpose and research question of this thesis. The subsequent section describes the research process, which includes the different parts this thesis consists of. The third section elaborates on the different studies in more detail and describes the methods used for selection, data collection, and analysis. This section includes how research quality has been considered during the design of the studies. The section also describes the methodology used for the analysis in this thesis. The chapter also addresses the different empirical scopes of the studies. The last section presents a reflection on methodology and discuss methodological choices that may have affected the results of the thesis.

3.1 Research approach

The aim of the work described in this thesis originates from an identified gap in the UCC literature. UCCs have the potential to improve distribution efficiency and the potential to reduce negative environmental effects in urban area, but they have historically not been long-lived. One major issue has been the lack of financial viability, while another is a difficulty to gain acceptance from stakeholders. The purpose of this thesis was therefore *to deepen the understanding of benefits for the customers of UCCs, with a particular focus on customer needs and benefits that UCCs can provide.*

The approach to answer the purpose was a descriptive approach, since a descriptive approach is often used in a research area that has been studied (Williams, 2007; Patel & Davidson, 2011). Descriptive approaches focus on relationships, and offer appropriate level of detail. In this case, a descriptive approach was appropriate, since the field has been studied before, but not from this angle.

Work to answer the first research question, *How can customer needs be described and understood?*, also took a descriptive approach, with additional work to understand the customer needs. The type of needs of UCC customers have been studied to a certain extent, but the work presented in this thesis took it one step further in describing them. The approach was to understand the needs on a deeper level by using a theoretical lens. The characteristics were then used to categorising the identified needs. A similar approach was used when answering the second research question, *How can customer benefits from UCCs be described and understood?*. The work here also included categorisation, and again stemmed from a theoretical lens. Work on the third research question, *In what ways can customer benefits be increased?*, included both an explorative part and a descriptive part. In-depth studies of customer benefits have been lacking in the UCC literature, and this is why explorative research was necessary. The descriptive part was needed because it is crucial to understand customer benefits in order

to be able to suggest ways to increase them. These ways to increase benefits that are identified can also improve the understanding between UCCs and customers, which may ultimately lead to greater customer satisfaction.

The overall research process consisted of several parts (see section 3.2). Most of the parts used a more deductive approach, one example of which is the generation of interview questions based on literature (see description from Arbnor & Bjerke, 1994). Other parts used a more inductive approach, and the empirical results of these contribute to the literature (see e.g. Arbnor & Bjerke, 1994; Bryman & Bell, 2015). Thus, both a deductive and an inductive research approach were used, with the deductive approach being more evident.

3.2 Research process

The overall research process for this thesis encompasses two narrative literature reviews, five separate studies, and a licentiate thesis. The licentiate thesis (Johansson, 2018) was defended early in 2018, and contained the narrative literature review of UCCs, and studies A, B and C (which are also parts of this doctorate thesis). The licentiate thesis played an important role in the overall research process, and shed light on what was still missing within the research area. This doctorate thesis has a similar point of departure as the licentiate thesis. Hence the licentiate thesis was the foundation of the work, and the doctoral thesis continues to build upon it. In this doctorate thesis, the studies are viewed through a theoretical lens that comprises customer benefit. The doctorate thesis and study E were part of a larger research project, *Financially sustainable consolidation centres*, which determined its overall research frame.

The first step of the research process was to gain a better understanding of what a UCC is, identify important references, and the problems with this area of study. To gain this understanding, a narrative literature review of UCCs was performed. The second narrative literature review was carried out to gain knowledge about the field of benefits. This is a wide research area, and it was very important to determine and understand how it can contribute to the UCC literature. The two reviews resulted in the formulation of the purpose and research questions.

Study A was a systematic literature review of UCCs, with the objective to survey what has been published and to identify research gaps. Both the first narrative literature review and Study A reviewed UCC literature. The difference was that the narrative review provided a basic understanding of the area, while the systematic review provided more in-depth knowledge. This made it easier to formulate the purpose, and ensured that most relevant literature and knowledge were identified. The purpose of the second study, study B, was to identify factors that made the studied UCCs successful. The perspective of the study was that of a UCC. Study C, in contrast, took the perspective of one type of potential UCC

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customers, i.e. retail stores. This study investigated whether UCC services were requested by the retail stores, and analysed how UCCs could improve their situation. Study D was a collaborative research study that was performed together with a non-profit organisation. The study aimed to propose a design of a business model for a distribution system of wasted edible food. One important aspect of the study was to explore other types of benefits for different stakeholders. The second narrative literature review was performed after the licentiate thesis had been defended, and focussed on customer benefits. This review was the foundation for the questionnaire used in study E and for the frame of reference of this thesis. Study E examined an operating UCC. The objective was to identify what made this system successful, taking the perspectives of the UCC and of the receivers. The need for this study became evident during the work with the licentiate thesis. This showed that it was necessary to not only take the perspective of an operating UCC, but also to study receivers that receive deliveries from a UCC. This study provided more in-depth descriptions than the previous studies, from both the receivers' point of view, and the UCC's point of view.

To summarise, the research has largely focussed on UCCs, and began with a study of the UCC literature. An important objective during the process was to capture the perspective of both UCCs and UCC customers. Studies A, B, and C constituted the foundation for the start of this doctorate thesis since they made it clear that more in-depth studies were needed. Study D and especially study E provided this. Table 1 summarises the parts of the research process and the method used.

Table 1. The different parts in this thesis

Parts	Method
Literature review (UCC)	Narrative literature review
Literature review (benefits)	Narrative literature review
Study A	Systematic literature review
Study B	Interview study
Study C	Survey-based interview study
Study D	Collaborative research
Study E	Case study

Some studies have been performed in parallel to some extent. One reason for this can be found in long waiting times before conferences and after submission to journals. Figure 4 below shows that study A started after both study B and study C. However, since study A is a literature review, knowledge regarding previous work on UCCs obtained from the other studies (B and C) provided a starting point to the study. The dashed line preceding study B indicates that the work began before my research process started. The study grew out of a conference paper, with new data and new analyses. The data analysed in study C were collected as part of the work for my Master's thesis, and this before the research process started (see Bergvall & Johansson, 2015).

The last part of the research process was the analysis presented in this thesis. This step tied together all parts of the research processes, answered the research questions, and fulfilled the purpose. An overview of the research process is illustrated in Figure 4 below.

Figure 4. The research process

3.3 Research design

The separate parts have been designed differently. The designs of the literature reviews are similar, while the design of the other studies have been carried out using different methodologies. During the design of the studies, the trustworthiness and research quality of the studies was considered, something that is important to keep in mind throughout the whole research process (Patel & Davidson, 2011). Quality criteria such as credibility, transferability, dependability, and confirmability have been applied to ensure high trustworthiness, as suggested by Halldorsson and Aastrup (2003).

3.3.1 Methodology in the narrative literature reviews

Narrative literature review of UCCs

An important step at the beginning of writing a thesis is to propose a purpose and to postulate research questions. Before doing so, the researcher needs to be familiar with the studied research area to understand what is already known, what is missing, and which the important references are (Bryman & Bell, 2015). The databases Scopus and Google scholar were used for this literature review, since to identify what has recently been published in an area, digital articles are usually the easiest way to get access to it (Patel & Davidson, 2011). The first step was to identify search terms. After a shorter initial scan through the research area, several important search terms were identified (as suggested by Patel & Davidson, 2011). The most important ones were urban consolidation centre and city logistics, but also different synonyms in order to capture as many relevant works as possible.

The review aimed at identifying articles that had been cited multiple times and important references in the field. After several articles were identified and read, a snowball approach (Cohen & Arieli, 2011) was used to identify early references that the area was built upon. It was also of interest to identify what articles had cited the early ones to identify new articles but also to understand how the area has evolved.

Narrative literature review of benefits

After it had been decided that UCCs and viability should be studied, it was necessary to determine which approach to use. The issues surrounding UCCs could potentially be ‘solved’ by studying them from a perspective of customer benefit. For example, addressing what benefits UCC customers can gain, may affect their attitude towards UCCs.

This review mainly focussed on literature reviews in the area to obtain an overview. Literature reviews often map areas, provide examples of how an area can be categorised, and list the most important references (Tranfield *et al.*, 2003). This was needed since customer benefits is a large research area with many branches and has been widely studied. The review took its point of departure in the larger area of customer value, since customer benefits are usually an important part in value literature. Therefore, search terms such as *value*, *literature*, and *review* were used. The terms were searched in title in articles from the Scopus database. The search resulted in approximately 200 articles. The abstract of each article was read, and articles that were not in the correct area were rejected. Approximately 80 articles remained. The full texts of these were then read, and irrelevant articles removed. This resulted in 30 articles, which were read in more detail. Most of the rejected articles deal with human values or only monetary value. The remaining articles gave a comprehensive understanding of the area.

It was possible to identify several research streams within the area, and most of them were large and widespread. This meant that it was necessary to decide the direction of this thesis work. Examples of the streams are: customer value in general, creation of value, and the accumulation of customer value (which includes how to increase customer benefits). The direction was decided by combining the knowledge obtained from the UCC literature together with this review. How customers can benefit, the types of benefits customers can gain from UCCs, and how customer benefits can be increased had not been studied in-depth related to UCCs, and these were chosen as focus areas. After both narrative literature reviews had been completed, it was possible to decide the purpose and research questions of this thesis. The literature review of benefits also resulted in the theoretical lens used for the analysis presented in this thesis.

3.3.2 Methodology in the studies

Study A – Systematic literature review

The first study was a systematic literature review to further gain knowledge about UCCs. Similar to a narrative literature review, the aim of a systematic review is to identify what has been published in the field, which methods have been applied, and to the most important references (Bryman & Bell, 2015). A systematic literature review, compared to a narrative review, is a more structured way to identify references, make it replicable, and to analyse the content (Tranfield *et al.*, 2003). The replicability also increases the study’s dependability.

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It can also be used to point of research gaps within the research field and to summarize what has been published in different areas (Tranfield *et al.*, 2003; Crowther & Cook, 2007).

Selection

The selected subject was UCCs, and the review included all journal articles that focussed on the initiative. Focussed means that the articles had to mentioned UCCs (or synonyms) in either the abstract, title or keywords. The reason was to include articles that extensively focus on UCCs, a similar approach used by e.g. Wong *et al.* (2015). The search terms were UCC and 20 different synonyms. The search terms were mainly from lists of different synonyms from Browne *et al.* (2005) and Wolpert and Reuter (2012). In the case that the search term was *city terminal*, the additional term *urban terminal* was added, and vice versa to further include as many relevant articles as possible since city and urban are often viewed as synonyms. The search included peer-reviewed journal articles to ensure a high standard among the identified articles, a method used by e.g. Touboulis and Walker (2015). All steps together and the systematic nature of the review ensured high reliability (Tranfield *et al.*, 2003).

Data collection

The data collection consisted of journal articles. A total of 21 different search terms were used for the search and the databases used were Scopus, Web of Science, and Business Source Premier. The use of different databases increases the likelihood to identify more relevant articles (Touboulis & Walker, 2015). The search in the databases yielded a result of 138 published journal articles. After a quick scan through the titles, several articles could be removed. The removed articles were either not written in English or in subject areas such as dentistry or medicine. After the exclusions, the total number of articles were 61.

Data analysis

The first step of the analysis was to further exclude articles that did not focus on UCCs. Both researchers involved in the study read the abstracts of all 61 articles separately and made separate lists of articles included, that were later combined. The second step involved a full-text reading of the articles, to include articles that focus extensively on UCCs. Again, both researchers read them individually and combined the lists afterwards. By doing this separately increase the credibility and confirmability (as explained by Halldorsson & Aastrup, 2003) of the results since both authors made their interpretations which were later discussed. This is also recommended by Crowther and Cook (2007). After both steps of exclusions, the number of articles was reduced to 48. The next step of the analysis was to read through the articles in more detail. During this read-through, the researchers classified the articles as 'more or less relevant', as suggested by Crowther and Cook (2007). An article that was considered 'more relevant' focussed on UCCs, 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 (see e.g. Cohen & Arieli, 2011) based on the 'more relevant' articles was

used. The snowball sampling yields an additional eight articles, which made the final sample 56 articles.

In order to analyse the content of the sample and to identify common areas between the articles, a content analysis was performed applying 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 and later combined. The exact terminology used in the articles was of secondary importance during the identification of potential areas. By doing it separately increase the confirmability of the analysis. These areas were later divided into categories and sub-categories. When the categories and sub-categories had been set, the remaining articles were placed in the appropriate categories.

Study B – Interview study

In this study, several UCCs were studied to identify critical factors in their business model, and an interview study was chosen to identify critical factors. This is compatible with the description of interviews given by Merriam (2011); to obtain information that cannot be observed.

Selection

Four criteria were used the cases were selected. (1) The business model should be viewed as very important by the owner of the UCC. (2) The UCC should be viable (a viable UCC was in this case defined as a UCC that fulfilled the goals set by the owner/initiator). (3) The UCC should be well-recognized by other organisations. (4) The selection should ensure a variety in owner, goods handled, location, and duration of the operation. The selection of cases can be described as target selection (see e.g. Merriam's, 2011 description of targeted selection), and the cases were selected according to the four criteria. The reason for this was that the objective of the study was to identify why some UCCs are viable and others are not. One employee was primarily targeted in all cases, the project leader or the individual who had been responsible for the initiative. This individual usually had overall control and knowledge of the initiative, and could thereby provide a comprehensive picture. By selecting people with the right knowledge also increase a study's credibility. Complementary interviews were conducted with other employees in the organisations for the first few UCCs studied. However, it became evident that the project leader had all the necessary information, and additional interviews with other employees were not required.

Data collection

Data were collected for five cases: three from Sweden, one from Italy and one from the Netherlands. Two researchers were present during all interviews, something that allowed investor triangulation (Montgomery, 2013). There are several advantages to having more than one interviewer present, such as the opportunity for one to focus on the interview

while the other focusses 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 increased the dependability (as described by Patel & Davidson, 2011). A high degree of standardisation also makes it easier to compare answers, as was done in this study. Something that increased the transferability (Halldorsson & Aastrup, 2003).

Analysis

The analysis aimed to identify factors that were common in several cases. Content from the interviews was matched to the descriptions of different areas in the business model canvas. The process is similar to content analysis. Bryman and Bell (2015) describe content analysis as the coding of text into different categories and themes. This classification enabled the cases to be compared, which made it possible to identify critical factors that occurred in several cases.

Study C – Survey-based interview study

This study focussed on a potential UCC customer type: retail stores in city malls. Retail stores have been identified as the potential customer that has most to gain from the use of UCCs. Moreover, many of the services that UCCs can provide are directed towards retail stores (see e.g. Browne *et al.*, 2007; van Rooijen & Quak, 2010). A survey-based interview study was chosen to gain deeper knowledge of the subject.

Selection

Retail stores in two Swedish cities were studied. City malls were first selected in the cities, and all retail stores within the malls were defined as subjects. The purpose of this study was to explore the types of needs that retail stores have (that UCCs can fulfil) and stores were selected based on geographical proximity. Interviews were selected to attain a high response rate compared to, for example, surveys (as noted by Bryman & Bell, 2015). The retail store assistants were selected to interview because they handle everyday tasks and could thus describe the problems they experienced.

Data collection

Data were collected using a survey-based methodology, with short and structured interviews. A total of 72 retail store assistants were interviewed. The interviews were based on a structured interview protocol (Patel & Davidson, 2011), in which the same questions were asked each time and in the same order. This increases the reliability of the replies (Halldorsson & Aastrup, 2003). It was important to maintain a fast pace during the interviews since they were held in the stores during opening hours. This choice was made because it was assessed that it would be easier to interview the assistants there during their regular work hours. Two researchers designing the questionnaire, and two were present

during each interview, which allowed investigator triangulation (see e.g. Montgomery, 2013).

Analysis

The analysis determined the potential demand for UCC services. A demand was assessed as present if there was a discrepancy between the respondents' answers concerning their needs and the services that UCCs can provide. The problems experienced by the retail stores' assistants and any requests their made (such as preferred delivery times and delivery frequencies) were listed. The researchers then matched these problems or requests in order to determine the potential of UCCs. That is, can UCCs satisfy the needs of this type of user? Finally, independent sample t-tests were performed (see e.g. Hair *et al.*, 2006) to investigate whether the number of deliveries a day was correlated with experienced provided customer service.

Study D – Collaborative research

This study concerned a redistribution system and was a collaborative research with two researchers and a non-profit organisation. The non-profit organisation was also the owner of the studied redistribution system. The study aimed at propose a potential business model for the redistribution system. Developing something together that can be used is one of the strengths of collaborative research (Bloedon & Stokes, 1994).

Selection

The non-profit organisation was selected, being one of the few existing organisations with a large-scale redistribution system in Sweden. The methodology included interviews, workshops, and a study visit. Several managers within the non-profit organisation were interviewed to gain an understanding of how the system functioned and what was missing. The participants in the workshops were stakeholders who had been involved in the redistribution operation in some way. The study visit allowed a benchmark to be established from a similar initiative in England. Benchmarking can bring important insights into how other initiatives have succeeded.

Data collection

Data were collected in a group interview with people working for the non-profit organisation. The interview subjects included the project manager, logistics manager, and storage manager. The results from the interviews were important to understand the situation and to plan how the study should proceed. Two workshops were held with representatives from the retail industry, food-producing industry, IT companies, and transport industry to discuss how they view the distribution system and what it lacks.

Analysis

The analysis covered literature of sustainable business models, the interviews, the workshops, and the study visit. The point of departure was the different parts of a sustainable business model. These parts were related to the data, to identify what has been lacking in the current system, and development strategies of the business model were proposed.

Study E – Case study

This study examined an operating UCC. The focus was both on the UCC, to identify what made it successful, and on its receivers. A case study methodology was chosen since it provides much in-depth information and allows to better understand a phenomenon (Yin, 2009; Bryman & Bell, 2015).

Selection

The UCC is one of the most successful UCCs in Sweden and has become financially self-sustaining, something that is uncommon. The case could thereby have significant impact on addressing a research problem, thus a high-impact case (Patton, 2014). The respondents from the UCC were selected due to their knowledge about it and its historical development. The respondents at the receivers were selected by the operative manager at the UCC.

Data collection

The data consisted of 13 interviews each of between 30 and 90 minutes' duration. Two interview questionnaires were used: one that focussed on the UCC's perspective and one that focussed on the receiver's perspective. Several questions were similar between the questionnaires, to make it possible to capture, for example, how the two sides view the relationship. The same questionnaire was used for all respondents in a group, which increased the reliability (Halldorsson & Aastrup, 2003; Patel & Davidson, 2011). The questions in both questionnaires were largely derived from the literature regarding both UCCs and customer benefits. The same researcher asked the questions in most of the interviews throughout the study, which increased credibility (Halldorsson & Aastrup, 2003). All of the interviews were recorded. A summary of the interviews was also sent to the relevant respondent for their approval, which improved the credibility and confirmability. The data also consisted of documents and observations at both the UCC and the receivers, which further deepened the case study, something that is recommended by Yin (2009).

Analysis

The data were compiled and condensed, and then presented in a case report. Some analysis was carried out, such as identification of the overarching themes. Further analyses of the data were carried out in this thesis frame.

3.3.3 Methodology for thesis frame analysis

The analysis of the first research question consisted of the identification of customer needs and their subsequent categorisation. The identification was obtained from the empirical results and the UCC literature, in order to achieve as comprehensive view of the needs as possible. Criteria used for the identification were that a customer need may be either a need that the UCC customers expressed or a problems that they experienced that UCCs may solve (see e.g. TURBLOG, 2011). The categorisation of the needs was based on the framework that is presented in section 2.3.1. The framework initially consisted of two levels, but a third level was introduced to illustrate the difference more accurately. This third level was between the two extremes. The terms used in the framework in this thesis were chosen to fit both the framework from Khalifa (2004) while still being applicable to the context of this thesis. During the analysis, the categories in the framework were related to the type of need, such as “basic” or “advanced”. Categories of the needs were defined by matching descriptions of the categories with characteristics of the identified needs, in a process that can described as “pattern coding” (see e.g. Miles *et al.*, 2014) . Every need was categorised, but the scale did not have a district demarcation between the levels. This means that some of the needs could be close to two levels. Nevertheless, the most important goal of the analysis was to identify the different characteristics of the needs, not to provide an exact categorisation.

The analysis of the second research question consisted of the identification of benefits that UCCs can provide and their subsequent categorisation. Benefits that UCCs can provide was based on viewing them as potential positive outcomes of using UCCs for the UCC customer. Similar to the work described in the previous section, the criteria were used to identify benefits throughout the UCC literature and the appended papers in this thesis. The categorisation of benefits was based on the presented framework presented in section 2.3.2. This framework also consisted of two levels on a scale, and a third level was therefore introduced to highlight differences between the extremes. Again, as described in the previous section, the terms in the framework were chosen to match the framework from e.g. Khalifa (2004) and the context of this thesis. The descriptions of the categories were matched to the characteristics of the benefits (similar to pattern coding, Miles *et al.*, 2014), in order to categorise the benefits. Some benefits were close to two levels, one of which was chosen, but the important goal was to identify characteristics of the benefits.

The first step in analysing the third research question was to identify ways that can improve UCC systems, while focussing on the customer needs and the benefits that UCCs can provide. The point of departure was related mainly to how the benefits for UCC customers could be increased. The process to identify these ways was related to whether either part (personnel at receivers or personnel at UCCs) mentioned how problems have been solved, or described important aspects that were viewed as positive. The ways could be a combination of empirical results and the UCC literature. One example of this may contain

a mention of a problem that previous work as shown that UCCs can solve. It was also necessary that the identified ways were present at several respondents or in several studies, to ensure research triangularity. The ways were also consolidated into several areas called “improvement areas”, to obtain an overview of the potential improvements. This consolidation was based on common characteristics of the identified ways and was carried out in an inductively process.

3.3.4 Overview of the studies

The different studies are summarised below in Table 2 below together with the used method and empirical object. As can be seen in the table, the studied object is different between the studies, hence the scope of the studies differs.

Table 2. Overview of the studies, the method used, and empirical objects

Study	Method	Empirical object
Study A	Systematic literature review	Journal articles
Study B	Interview study*	Project leader for UCCs
Study C	Survey-based interview study	Retail stores
Study D	Collaborative research*	Various stakeholders in the distribution system
Study E	Case study	Various respondents in a UCC system

* Termed differently in the article due to the context of the article

Scope of the studies

As shown in Table 2 above, the studies had different empirical objects, both when it comes to stakeholders (e.g. receiver or municipality) and stakeholder type (e.g. receivers being either municipal receivers or private receivers).

The “empirical scope” of study A was journal articles that focus on UCCs. Study B examined five UCCs. Three of these were owned by municipalities, one was owned by a non-profit organisation, and one was a collaboration between several stakeholders. Two of the municipality-owned UCCs delivered solely to municipal units. For the three remaining initiatives, the UCC delivered to privately owned receivers. This is an important distinction, because aspects, such as overall objectives, may differ. For example, the financial aspect was usually not as important when municipalities were the initiator, since they often strive to achieve other types of benefits, such as a more attractive city area. Study C examined one type of potential UCC customer, retail stores. Study D differs somewhat from the other studies, in the sense that the scope here was a different type of distribution system and with other types of stakeholders. Finally, study E focussed on an existing UCC that was owned by the municipality and had only municipal receivers. This was an example in which the goals of the initiator focussed on both a more attractive urban area and the financial aspect.

Each study has resulted in a paper (presented in the Chapter 4 in the thesis). The frame of reference used in this thesis, and thus the frameworks in which the papers have been

analysed differ from those used in the papers. In other words, the frameworks in this thesis analysed the results from the papers. Consequently, the purpose of this thesis differs compared to the purposes of the papers. However, all of the studies were directed at UCC systems (except study D), and their results were viewed through a lens that is based on previous work. Furthermore, this thesis focusses on customer benefits, and these are included to some extent in every study. The term “benefits” can also have different meanings, and one important part of this thesis has been to identify different types of benefits.

3.4 Reflection on methodology

3.4.1 Selection of respondents

The respondents in the receiver group included people from both the private and public sectors to ensure that views from both sectors were captured. Receivers in the public sector usually have demands and goals that differ from those of receivers in the private sector. Municipal receivers receive their income from the municipality, and most of them do not have to strive for economic equilibrium. This may affect how they view their needs and the potential benefits from UCCs. These receivers may request extra services, since the economic pressure is not as pressing as it is for private companies. Another point worth highlighting is that it was mandatory for municipal receivers to use UCCs. This can affect the results and their view of the UCCs.

3.4.2 Geographical context

The data have been collected in a Swedish context, with the exception of two cases in study B. This may have affected the results and external validity of the conclusions. Certain problems and request from UCC customers, and certain benefits that UCCs can provide, may depend on the context. Aspects such as the design of distribution systems, the nature of consumer requirements, and the layout of cities are likely to differ between countries. However, results from the Swedish studies have been combined with results from previous international studies presented in the UCC literature, which has ensured that other contexts are included, which increased the external validity.

3.4.3 The categorisation

Both customer needs and customer benefit can be categorised in other ways than those presented in this thesis. Different researchers might divide the needs and benefits differently, and define different categories. However, this thesis strived to illustrate one possible categorisation, and to demonstrate how this can be related to characteristics. These two goals deepen the understanding of customer needs and customer benefits.

3.4.4 The identifying ways to increase customer benefits

The third research question addressed how the benefits for UCC customers can be increased. The ways identified in this thesis are based on the studies, the selection of

subjects, and the author's interpretation of the results. It is possible that other researchers working with different data would identify similar ways, although they may use different terms to describe them. It is also possible that other ways would be identified. The ways to increase customer benefits presented in this thesis should therefore be viewed as suggestions.

3.4.5 Ethical considerations

Ethical considerations have been an integral part of the studies presented, and of the work with this thesis. The respondents have remained anonymous, which reduced the risk of them feeling exposed. A summary of the interview was distributed to all respondents in study B and study E. The respondents could review, and confirm that their views had been correctly captured. All respondents also had the opportunity to correct any inaccuracies. All interviews were recorded with the consent of the respondent, and have been treated with professional confidentiality. Regarding gender of the respondents, no consideration was made to mainly include a certain gender. This resulted in that all studies had an equal distribution of the genders.

4 Summary and Contribution of Papers

This chapter provides an overview of the appended papers in this thesis. The chapter presents each paper with a summary that presents the purpose, method, and findings. Each section also describes the contribution of each paper to the analysis in this thesis. The chapter ends with a table that relates the papers to the research questions.

The papers are directly related to the various studies presented in the methodology chapter. Study A resulted in paper I, study B resulted in paper II, etc. This means that the studies are not further discussed. The papers and the results from the papers are instead used in the rest of this thesis.

4.1 Paper I

Urban consolidation centre-a literature review, categorisation, and a future agenda

Björklund, M. & Johansson, H. (2018). Urban consolidation centre-a literature review, categorisation, and a future research agenda, International Journal of Physical Distribution & Logistics Management, 48(8), 745-764.

Summary

The focus of paper I was to describe the research area and to identify research gaps in previous work by carrying out a systematic literature review. 21 search terms were used in the review: “urban consolidation centre” and its synonyms. A total of 56 journal articles were identified, together with a subsequent snowball sampling.

Five different topics were identified to describe the area: the role of stakeholders, the design of distribution structures, the design of transport resources, environmental and social considerations, and economic considerations. The topics provided a more comprehensive view of the UCC literature. Research gaps were identified both within the above-mentioned topics and outside of them. The gaps were, for example, a failure to consider all sustainability dimensions together, a lack of understanding of UCC services and benefits, and a lack of primary data in studies of UCCs. Furthermore, much previous work has been directed towards finding “optimal” solutions and designs for initiatives, with very little consideration of financial viability or the management of the UCC initiatives.

Contribution to the thesis

References have been identified associated with the various topics. These have been used throughout this thesis. The references have a significant part in the introduction and frame

of reference. Many important references also reappear in the analysis of this thesis, and in this way enrich it. Such reappearing references contribute mainly to answering research questions one and two. They achieve this by, for example, providing descriptions of various customer needs and benefits that UCCs can provide. The results from the paper also form a basis for identifying gaps that contribute to the analysis of the third research question.

4.2 Paper II

Critical factors for viable business models for urban consolidation centres

Björklund, M., Abrahamsson, M. & Johansson, H. (2017). Critical factors for viable business models for urban consolidation centres, Research in Transportation Economics, 64, 36-47.

Summary

Paper II describes studies of five UCC initiatives and identifies critical factors that have contributed to the long-term functioning of these initiatives. The point of departure in the paper was to use a business model canvas to identify the factors. This canvas has previously been used by Quak *et al.* (2014).

Seven factors were identified as critical for attaining the long-term functioning of UCCs, namely:

- The ability to scale the business model up and down to achieve economies of scope.
- Ability to continuously develop and adapt the business model to a dynamic environment, including attracting new customers, new services, and city regulations.
- Maintaining the entrepreneurial role of the initiator and developing suitable organisational forms.
- Acknowledging municipalities as a customer and a party that can generate revenue for UCCs.
- An ability to provide new services for customers that generate revenue.
- Expertise in logistics and supply chain management in order to access potential value streams.
- The ability to take full advantage of IT system.

The paper also highlights the differences between the results when municipalities initiate a UCC and when the initiators come from the commercial side. The systems in the latter case are more open, with more active customers, and a focus on profitability. In contrast, in the former case the systems are created more closed, the customers are more passive, and a greater focus is placed on societal benefits.

Contribution to the thesis

The main contribution of the paper to this thesis is the identification of the critical factors. Further, the highlighting of new services, such as information sharing between stakeholders, contributes to the analysis of the second research question by describing potential benefits what UCCs can offer. The paper also shows how important it is to view municipalities as customers of UCCs, and it highlights the societal benefits that UCCs can give. This in turn adds to the analysis of the first two research questions.

The identified critical factors can also contribute to how the benefits for receivers of goods can increase. One way is to adjust the business model of UCCs and offer new services to receivers that matches their needs. Furthermore, the organisational forms developed are important (such as an organised body that represents receivers), since UCCs can seldom communicate and negotiate with every receiver. Moreover, it is important that the UCC operation possesses expertise in logistics, and this can help understand the needs of the receivers. This can, in turn, lead to better adjustment of services offered and thus giving increased benefits for receivers. Finally, the paper contributes to the analysis by analysing the differences between commercially driven UCCs and those initiated by a municipality.

4.3 Paper III

Urban consolidation centres: retail stores' demands for UCC services

Jobansson, H. & Björklund, M. (2017). Urban consolidation centres: retail stores' demands for UCC services, International Journal of Physical Distribution & Logistics Management, 47(7), 646-662.

Summary

Paper III focusses on a potential UCC customer, namely retail stores. The focus was to investigate the demands that such customers may have for various UCC services. 72 replies from retail store assistants were gathered in a survey-based interview study. The results showed that requests for potential UCC services were in general low. However, many of the respondents expressed problems with delivery times, the reception of goods, in-store logistics activities, and the availability of storage space. All of the problems are aspects that UCCs can help with. The paper points out that stores were often lacking a holistic view, and did not see the connections between the problems they had and possible services from UCCs. Instead, it was common that they had arranged alternative solutions to the problems, some of which were cost-inefficient (such as temporary increase in the workforce). Examples of customer needs that were identified are change of delivery time and more storage.

Contribution to the thesis

The analysis of the paper allowed several customer needs to be identified. These needs are the basis for the analysis of the first research questions, and contribute to the analysis with

rich descriptions of the them. Examples of the needs identified are the need for earlier deliveries, the need for less disturbance from incoming deliveries, and the need for more permanent storage space. The results also showed that problems with certain in-store activities could affect the service provided to consumers. The analysis also showed that some receivers were more aware of problems than others. Further, some receivers were very reluctant to use any additional services, while others were more positive. This contributes to the analysis of the first and third research question, with examples of how customer groups can be segmented on the basis of customer needs.

One of the main conclusions of the paper is that the receivers fail to take a holistic view, and this can affect how they view potential UCC services. The failure also affects whether they are aware of potential benefits. In many cases, problems were solved by measures of doubtful cost-efficiency, such as increasing the workforce on days with large number of deliveries. This aspect also contributes to the analysis of the third research question.

4.4 Paper IV

Designing a business model for redistribution of surplus food

Björklund, M. & Johansson, H. (2018). Designing a business model for redistribution of surplus food, Book of proceedings presented at NOFOMA conference, 13-15 June 2018.

Summary

Paper IV describes a study of a redistribution system with the aim of identifying potential designs of a business model for a national redistribution system for surplus food. One important part of this was to identify prerequisites that need to be addressed in order to make the model operational. The data came from interviews, workshops, and study visits. The analysis describes the prerequisites based on previous studies in sustainable business models. The prerequisites that were identified include the need to determine a development strategy, to develop a way to segment customers, and to measure and communicate benefits to customers.

Contribution to the thesis

Several different benefits for different stakeholders were identified in the paper. These results contribute mainly to an analysis of the second research question, with examples and descriptions. The work described in the paper did not study a conventional UCC system, although it had some similarities with such a system. For example, both the food redistribution system and a conventional UCC include a type of terminal, with transports as a major part of the operations, and can have positive effects in both environmental and social dimensions. Both systems also provide societal benefits, and the paper thus contributes to the analysis related to this. These benefits may be, for example, improvements to the environment, a way to reduce the environmental footprints (applies

to both companies and municipalities), and the creation of good publicity (applies to both companies and municipalities).

4.5 Paper V

Johansson, H. (2019). Case report – a study on Eskilstuna's transshipment centre from two perspectives, case report, unpublished.

Summary

Paper V is a case report that studied an operational UCC in Sweden. This is a successful UCC that has achieved self-financing and led to a large reduction in the number of freight deliveries. The study took perspectives of both the UCC and the receivers, and investigated customer needs and customer benefits. A total of 13 interviews were held with respondents from both perspectives.

The UCC is viewed as successful by the municipality, and has met its initial goals. Two of the driving forces when introducing the UCC were to reduce the driven kilometres and increase the security around schools. The receivers of goods are generally satisfied with how the UCC handle deliveries. The largest change for the receivers after the UCC was introduced was a dramatic decrease in the number of deliveries, with most being handled by the UCC. Most of the receivers are also satisfied with the contact with personnel at the UCC and appreciate the fast feedback that it gives. The case report summarises customer needs that were identified by the receivers, such as the need for storage for larger purchases. Furthermore, several customer benefits are also identified, such as improvement in the working environment for receivers.

Contribution to the thesis

The results from the case report contribute to the analysis of all research questions. The report highlights several customer needs and provides a rich description of them. These needs and the description of them provide a basis and an important part when understanding customer needs. The case report also enables several characteristics of the needs to be identified, and thus contributes to the analysis of the first research question. The report also takes the perspective of a UCC, and identifies several benefits it can provide and provides a rich description of the benefits. The case report thereby contributes to the analysis of the second research question. Similar to customer needs, identifying and describing these benefits is a base for understanding them. Certain important factors and gaps can be identified when the perspectives of both receivers and the UCC are taken, which contributes to the analysis of the third research question. For example, the lack of a holistic is present on both the UCC's side and the receivers' side. Further, receivers do not think about what the UCC offers and what it could offer. From the other perspective, the personnel at the UCC are not completely aware of the needs of the receivers, and rarely communicate estimations of the benefits that using the UCC can give.

4.6 Overview of the papers with relation to the research questions

The papers have different impacts on the analysis of the research questions in this thesis, this overview is illustrated in Table 3 below. The table is a summarisation of the contributions to the thesis described above.

Table 3. Overview of the papers and how they contribute to the research questions

	Paper I	Paper II	Paper III	Paper IV	Paper V
Method	Systematic literature review	Interview study	Survey-based interview	Collaborative research	Case study
RQ1	x	x	X		X
RQ2	x	X		x	X
RQ3	x	x	X		X

x: Minor contribution to the analysis of the research question

X: Major contribution to the analysis of the research question

5 Analysis and Discussion

The chapter presents the analysis and discussion. The first section describes the identified customer needs and how these are categorised. Each section starts with describing each need, together with examples from the papers in this thesis, and examples from previous work on UCCs. This section ends with an analytical overview that addresses aspects that relate to all needs. The second section follows the same structure, but focusses on customer benefits. This section also ends with an analytical overview. The third section addresses the third research question and builds on the previous two analyses. The section identifies areas that can enable customer benefits to be increased. The final section presents a reflection of the analysis.

5.1 How customer needs can be understood and described

Several steps are necessary to answer the first research question (*how customer needs can be described and understood*). The first step is to identify customer needs, which is disintegrated to several sub-needs. Sub-needs within one customer need share similar features. These customer needs can be described using the results from the appended papers in this thesis and results from previous studies. The final step is to categorise the identified sub-needs (using the framework presented below). Categorisation of needs can give a deeper understanding of needs (Groth, 1994; Urwiler & Frolick, 2008). It can also illuminate how the benefits that the customers can gain are affected by meeting different needs with different categorisations (Khalifa, 2004). Another benefit of categorising needs is that it can make it easier to determine how the needs can be met (Groth, 1994; Solomon, 2010).

5.1.1 Adapted framework for categorising customer needs

The framework for categorising customer needs has been presented in the frame of reference of this thesis, in section 2.3.1. However, no clear levels have been established between the two extremes (utility and psychic needs). Khalifa (2004) highlights the two extremes, and Groth (1994) shows that further levels can exist between the extremes. The third level is here termed **supplemental** needs, and is used to highlight the middle. The adapted framework with the three levels is presented below from a logistics perspective. Note that the number of levels is not the most important, but rather illustrate that several levels can exist. Similarly, it is not the categorisation itself nor the exact number of identified customer needs that are important; this section strives to provide examples of how the categorisation can be done, and highlights various characteristics of customer needs. The categories defined here are:

- **Utility needs:** these are concrete needs that often are needed for a business to function. These needs can also be described as “logical” or “rational”. An example is the need to receive deliveries.
- **Supplemental needs:** these lie between utility and psychic needs. These needs go beyond utility needs, and can thus be viewed as supplementals, e.g. improvements to an organisation. Such improvements are often not necessary for a business to function, but enable it to function more efficiently. Examples of such needs within logistics can be the need to request delivery time, or the need to receive additional information about forthcoming deliveries.
- **Psychic needs:** these are not necessary for a business to function. The needs are more optional than needs in the other categories. Needs in this category is viewed as something extra. Psychic needs can have an emotional component (Solomon, 2010). Examples are the need to feel more secure about the time of delivery and the need to reduce stress.

5.1.2 Describing and categorising customer needs

Each identified customer needs (listed below) consists of a number of sub-needs (presented in *italics*). The categorisation is based on the results from the papers in this thesis (shown as illustrative examples in tables below) and previous work in the area. Several customer needs have been identified:

- Receiving goods
- Reducing the number of freight deliveries in urban areas
- Reducing the disturbances of personnel
- Storage
- Extra handling
- Providing high-quality customer service
- An increased cost-efficiency

Receiving goods

Receiving goods is an apparent customer need for most businesses and other types of units. The goods may be anything from products that are going to be sold or office materials (e.g. Allen *et al.*, 2012; Gammelgaard *et al.*, 2016). All of the papers in this thesis support the results of previous work. Even so, examples of other types of receiving units were identified, namely school kitchens and physiotherapist units (paper V). The need can be broken down into six sub-needs: *Reception of goods*, *reliable deliveries*, *request delivery time*, *shorter delivery times*, *receive information about deliveries*, and *personal contact with the driver*. Table 4 below presents the sub-needs.

5 Analysis and Discussion

Reception of goods is necessary for any business to function. For stores to sell products and for kitchens to prepare food. The exception may be some types of offices that can function in short-term without receiving goods. Reception of goods is thus a **utility** need.

Reliable deliveries are not as important as receiving the deliveries, but reliability is a concrete need. In addition, a higher reliability of deliveries has many positive effects. It is, for example, often needed for a business to function efficiently, since reliable deliveries reduce uncertainty and make it easier to plan both activities and personnel. This sub-need has thus been categorised as a **utility** need. However, the sub-need has properties that make it possible to place it into one of two categories. The utility category has been chosen since reliable deliveries are often important and concrete.

Request delivery time is also not an absolute necessity, but it can ease the working situation for personnel at receivers. If delivery times can be requested, receivers can request times that suit them and, in this way, reduce interruptions. Meeting this sub-need can increase the efficiency of businesses. The ability to request delivery times has therefore been categorised as a **supplemental** need.

Shorter delivery times are usually not necessary for a business to function, and potential problems due to longer delivery times can be solved by planning. Shorter deliveries can, however, make businesses to function more efficiently, and often ease any emergency situations that arise. They may also help receivers to provide better service for their customers. The sub-need may be important for a business, but its lack does not usually cause as serious problems as, for example, unreliable deliveries. Hence, the sub-need has been categorised as a **supplemental** need.

Receive information about deliveries include information about the content of deliveries, possibly delays, etc. This information makes it easier for receivers to plan activities that depend on reception of goods. It can also make the personnel feel more secure (particularly the case for information delays). The information can have positive effects, but is in general not crucial. The sub-need has therefore been categorised as a **supplemental** need. Receiving information is concrete, but the type of information that is needed and what the receiver is to do with it are not always clear. Thus, this sub-need has some characteristics of a psychic need.

Personal contact with the driver is a sub-need that is primarily directed to the ‘emotional side’. Receivers can feel more secure and can more easily communicate with a driver whom they meet often. The sub-need has therefore been categorised as a **psychic** need.

Table 4. Receiving goods, overview of the need with illustrative examples

Sub-need	Categorisation	Illustrative examples
Reception of goods	Utility	<ul style="list-style-type: none"> Regular deliveries are needed for retail stores (paper III) and kitchens (paper V)
Reliable deliveries	Utility	<ul style="list-style-type: none"> It is important that deliveries are reliable, but the businesses can function with unreliable deliveries (paper III; paper V) More reliable delivery times can reduce the risk of receiving deliveries at inappropriate times and can make it easier to plan the day (paper III; paper V) Unreliable delivery times, often leave personnel disturbed by deliveries (paper III)
Request delivery time	Supplemental	<ul style="list-style-type: none"> Many respondents highlighted requesting delivery times as very important and something that gave several benefits (paper III; paper V) Even if the stores could still function, most assistants at retail stores were not satisfied with the current time of delivery and wanted to change it (paper III) Receiving deliveries at inappropriate times disturbed the personnel during other activities and increased stress for them (paper III; paper V) Deliveries at inappropriate times may have a negative effect customer service (paper III)
Shorter delivery time	Supplemental	<ul style="list-style-type: none"> It could be beneficial if the delivery times were shorter (paper V) Shorter delivery times would be nice, but this is not a major issue after some adjustments (paper V)
Receive information about deliveries	Supplemental	<ul style="list-style-type: none"> Information about late deliveries or if something was missing was appreciated (paper V) With delivery information, respondents could rework their planned activities (paper V) It was recognised that information regarding deliveries could reduce stress for the personnel, but a lack of information could often be handled with better planning (paper V)
Personal contact with the driver	Psychic	<ul style="list-style-type: none"> Meeting the same driver provided a feeling of higher security, and made it possible to pose some special requests (paper V) It can be easier for the receiver to communicate with a known driver (paper V)

Browne *et al.* (2005) and Aastrup *et al.* (2012) mention the necessity for receiving deliveries for operational function, which is in line with the results presented in the papers in this thesis. Unreliable delivery times can cause many issues, especially for some types of stores (Aastrup *et al.*, 2012; Gammelgaard *et al.*, 2016). Unreliable delivery times also caused difficulties for the planning of personnel and activities (Quak & Tavasszy, 2011). One common problem for receivers who experience unreliable delivery times is that they must constantly interrupt their work (Aastrup *et al.*, 2012). Requesting delivery time is another

customer need that is mentioned by Aastrup *et al.* (2012). This is partly confirmed by the papers in this thesis, which provide more details about how the different sub-needs can affect the receivers.

Reducing the number of freight vehicles in urban areas

Reducing the number of freight vehicles in urban areas is a need that municipalities have, since they are responsible for the attractiveness of these areas. Such a reduction in number will also reduce emissions, reduce traffic congestion, and reduce the risk of accidents (van Rooijen & Quak, 2010; Allen *et al.*, 2012). The conclusions from paper II and paper V are much in line with this, where all respondents who were connected to the UCC operation highlighted this as a driving factor for the implementation of the UCCs. The need can be divided into two sub-needs, namely *greener and more attractive urban area* and a *more secure environment*. Table 5 below shows the sub-needs with the categorisations.

Greener and more attractive urban area is one results of reducing the number of freight vehicles. This sub-need differs from the other sub-needs since it is a sub-need of municipalities, not businesses. Meeting the sub-need can decrease traffic congestion, the degree of occupation of unloading docks, emissions, and the number of delivery vehicles parked on streets and in public spaces. Especially traffic congestion and a high occupation of streets can cause inefficiency in cities, giving rise to queues and limits to accessibility. The sub-need has been thereby categorised as a **supplemental** need.

More secure environment refers to a higher traffic security with fewer accidents. It is believed that fewer freight vehicles will results in fewer accidents, i.e. higher traffic security. This is an important consideration for municipalities. It is, however, not needed for a city to function efficiently. The sub-need has been categorised as a **supplemental** need but share similarities with the psychic category.

Table 5. Reducing the number of freight vehicles in urban area, overview of the need with illustrative examples

Sub-need	Categorisation	Illustrative examples
Greener and more attractive urban area	Supplemental	<ul style="list-style-type: none"> • A more attractive city area was a driving force for most initiatives (paper II) • Reduced emissions were a driving force to initiate UCCs (paper II)
More secure environment	Supplemental	<ul style="list-style-type: none"> • One driving force to introduce the UCC was a need to increase traffic safety, especially around schools (paper V)

Both the need for a greener and more attractive city and for a more secure environment have been previously identified (see e.g. Quak & Tavasszy, 2011; Ballantyne *et al.*, 2013). The presence of many freight vehicles that negatively affects a “greener and more attractive urban area” also causes problems with queues at loading spaces, and when unloading on

narrow streets (Björklund & Martinsen, 2014). The freight vehicles are a problem that affects the efficiency in cities and hampers the feeling of security (Björklund & Martinsen, 2014). The identified sub-needs have been previously identified, but the results from the papers in this thesis highlight these sub-needs as driving forces to introduce UCCs. The papers also demonstrate the importance to also consider traffic security, especially around schools, when addressing improved urban environment.

Reduce the disturbances of personnel

Reducing the disturbance experienced by personnel can be considered a need for different types of receivers, such as retail stores or kitchens. Receiving deliveries and executing various logistics activities can disturb personnel during other tasks (Aastrup *et al.*, 2012). The results presented in paper III showed similarities with this, where personnel at retail stores viewed both the reception of goods and in-store logistics activities as disturbing elements. Several respondents in paper V also noted that they were disturbed if the deliveries arrived during food preparations. Identified sub-need are *reduce disturbance related logistics activities*, *reduce disturbance related to ordering*, and *reduce disturbance related to reception of goods*. Table 6 below illustrate the sub-needs with categorisation.

Reduce disturbance relate to logistics activities can arise at all types of receivers. Logistics activities must be carried out, and these activities can take some time. A failure to carry out such activities can lead to problems for the personnel. However, receivers often find alternative solutions to issues that come up, and this makes it difficult to evaluate how large a problem it is. Even so, the level of customer service provided may be negatively affected if the personnel are occupied with logistics activities. The sub-need has for this reason been categorised as a **supplemental** need. The category into which this sub-need should be placed is not immediately obvious, particularly in the light of the results from paper III, which showed that it was generally not a problem. However, the potential problems justify the categorisation.

Reduce disturbance related to ordering describe how personnel are disturbed by the process of ordering products. This sub-need considers inefficiencies in the current ordering systems and not the fact of placing orders, since this is necessary for businesses to function. The efficiency can be affected if personnel are disturbed by the ordering, but this is usually experienced as annoying and not a major problem. The sub-need has for this reason been categorised as a **supplemental** need.

Reduce disturbance related to reception of goods is present for most businesses that receive deliveries, since the goods received must usually be handled in some way. However, the duration of the reception process is usually short and it typically does not seriously affect businesses. Even if this is often is viewed as an issue, recipients often find ways to reduce the negative effects. The sub-need has therefore been categorised as a supplemental need. The sub-need has properties that enable it to be placed in either of two categories. A

delivery may be a disturbing moment, but it usually does not severely affect businesses since its duration is short.

Table 6. Reducing the disturbances of personnel, overview of the need with illustrative examples

Sub-need	Categorisation	Illustrative examples
Reduce disturbance related to logistics activities	Supplemental	<ul style="list-style-type: none"> Logistics activities hindered personnel from providing high-quality customer service (paper III) The request for services that can reduce the disturbances of personnel was low (paper III)
Reduce disturbance related to ordering	Supplemental	<ul style="list-style-type: none"> Having multiple systems leads to extra steps and takes up a lot of time (paper V) It is troublesome to have to contact several suppliers, and it is sometimes difficult to know who to contact (paper V)
Reduce disturbance related to reception of goods	Supplemental	<ul style="list-style-type: none"> The reception of goods can be disturbing, especially if it arrives at inappropriate times (paper V) Most of the stores did not perceive reception of goods as a problem (paper III)

Aastrup *et al.* (2012) and Quak and Tavasszy (2011) note that receivers can be disturbed by the reception of goods and when carry out other logistics activities. Their work, however, identified the unreliability of delivery times as the main cause. The results from the appended papers are very much in line with previous work, but highlight the issue that inefficiency of the ordering system as a disturbing element. Another important finding in this thesis is that receivers often find alternative ways when problems arise, which affect how often they are disturbed. These alternative ways can be different types of sub-optimisations (as identified in paper III).

Storage

Storage is a common need for receivers, and has been identified in Aastrup *et al.* (2012) and Gammelgaard *et al.* (2016). In line with the literature, this need was identified in paper III and paper V and showed that most respondents requested it. The need can be broken down into the following sub-needs: *more storage space*, *keeping track of products*, *external storage for large purchases*, and *external storage for special purchases*. Table 7 below presents the sub-needs.

More storage space is usually not considered to be an absolute necessity, although it can often have a positive effect and improve businesses efficiency. A lack of storage space may result in products being left out in the open or a need for more deliveries, both of which lower the efficiency of businesses. The need for more storage is also a concrete need, and it is important for receivers who have limited storage space. The sub-need has been categorised as a **utility** need, although some of its properties suggest that it could be classified as a supplemental need.

Keeping track of products requires an inventory system in the external storage. This is a need mainly for businesses that do not have an inventory system. Not having a system lead to confusion and extra work for personnel, especially if several units shares the same equipment. This may lead to inefficient practices and unnecessary transports. The sub-need has for this reason been categorised as a **supplemental** need.

External storage for large purchases is not necessary and is viewed as something extra. The benefits of meeting the need is the potential to lower purchasing price due to larger purchases, or the ability to use seasonal products for a longer period. If this sub-need is not met, more deliveries may be necessary. Since the sub-need is something extra and that there are few downsides, it has been categorised as a **supplemental** need.

External storage for special purchases is a very specific sub-need and not all businesses have it. It should also be viewed as something extra. If several receivers use the same equipment at different times, the purchasing cost can be divided between them. The sub-need has thus been categorised as a **psychic** need. This is one example in which a sub-need is categorised as a psychic need, even though it does not involve emotional aspects.

Table 7. Storage, overview of the need with illustrative examples

Sub-need	Categorisation	Illustrative examples
More storage space	Utility	<ul style="list-style-type: none"> • Most of the respondents requested more storage space (paper III) • With more storage space the number of deliveries can be reduced, which can have multiple positive effects (paper V) • The current storage space is a limiting factor (paper V)
Keeping track of products	Supplemental	<ul style="list-style-type: none"> • With an inventory system, the units can easily see where the equipment is, and usually do not have to transport it between units (paper V) • It was difficult to know where the equipment was before the UCC (paper V)
External storage for large purchases	Supplemental	<ul style="list-style-type: none"> • The UCC can use its storage to purchase large quantities and in this way reduce unit cost of products (paper V) • The UCC storage can be used to store seasonal products (paper V)
External storage for special purchases	Psychic	<ul style="list-style-type: none"> • Special products, such as special cooking equipment, can be stored at the UCC and the units can 'lease' it. The receiving units can share the initial cost (paper V)

Storage has previously been identified as a customer need that can reduce the number of deliveries when used as a buffer (Gammelgaard *et al.*, 2016). Difficulty in keeping track of products due to an inaccurate inventory system has also been previously identified as a problem for stores (Aastrup *et al.*, 2012). The inaccuracy can also lead to inferior customer service. The empirical results presented in this thesis agree to a large extent with previous

results, and provide further examples of how external storage can be used, especially that receiver pointed out that storage at UCCs can be used to store special purchases that can be shared between multiple receivers. The results from the papers also highlight the importance of keeping track of products and equipment, something that was an important factor when the UCC was introduced (paper V).

Extra handling

The need for extra handling includes activities that UCCs could carry out. These activities are connected to a certain extent to the core operation of UCCs, and mostly involve some type of distribution. One type of extra handling is handling waste and returns (Aastrup *et al.*, 2012). Several respondents described in paper V expressed the need for extra deliveries, either from the UCC to the unit or from one unit to another. The customer need can be broken down into *extra distribution* and *extra 'other'*. Table 8 below presents the sub-needs and the categorisation.

Extra distribution describes activities that are 'extra' and are connected in some way with transport. However, what is deemed to be extra depends on the situation. Extra distributions may be transports between units or express deliveries that are outside the normal schedule. These extra deliveries can have a positive impact on receivers. They can, for example, increase receivers' efficiency by providing rapid deliveries and making it unnecessary for personnel at receivers to perform deliveries themselves. This sub-need has been categorised as a **supplemental** need.

Extra 'other' describes activities that are 'extra' and are not transport-related. Again, what is deemed to be extra depends on the situation. Activities that satisfy this sub-need are closely related to the operation of UCCs. It can, for example, be activities that are related in some way to handling products. Activities in this sub-need may be activities that receivers perform themselves but could be performed by UCCs instead. This sub-need is thus not a necessity and has been categorised as a **supplemental** need.

Table 8. Extra handling, overview of the need with illustrative examples

Sub-need	Categorisation	Illustrative examples
Extra distribution	Supplemental	<ul style="list-style-type: none"> • Personnel drive between units with equipment, which is considered a problem (paper V) • There is a need to handle used packing materials (paper V)
Extra 'other'	Supplemental	<ul style="list-style-type: none"> • It would be preferable that the UCC clean the healthcare equipment, since it is already stored there (paper V) • It would be beneficial if personnel at the UCC rearranged products in steel cages (paper V)

Providing high-quality customer service

All businesses should strive to provide high-quality customer service, since it is important in attracting and retaining customers. Aastrup *et al.* (2012) note that customer service is a major consideration for different types of stores. The results from paper III indicated that some of the assistants employed in retail stores were prevented from providing high-quality customer service. This was due to reception of deliveries and in-store logistics activities. However, relatively few assistants were aware of it. The results from the paper indicate that respondents had worked out other solutions when they are busy. Some of these solutions were, however, sub-optimisations. The respondents in the paper V did not believe that their customer noticed when personnel were disturbed by other activities. The level of perceived customer service was thereby not affected.

This customer need does not have any identified sub-needs. This is partly because the need is closely related to some of the needs listed above (e.g. *reducing the disturbances of personnel* and *storage*). However, it is still interesting to highlight this need, since it is so important for most types of business.

An increased cost-efficiency

An increased cost efficiency is central for most businesses (OECD, 2003; Quak & Tavasszy, 2011). Several studies have shown that receivers, for example, can reduce costs by using UCCs (van Rooijen & Quak, 2010; Allen *et al.*, 2012). The results presented in paper II showed similarities to previous literature. The results showed, for example, how UCCs have been used to reduce cost for the system. All managers at the UCC described in paper V also noted this. The potential for cost reduction can also be illustrated by the following quotation from Aastrup *et al.* (2012): "*I think that I before the contract with Binnenstad spend more money than I do know, on labour and other things, that I can now save and spend in my shop to make the theatre even better for the customer*" (pg. 11). Although the results from presented in paper III somewhat contradict those from studies by, for example, Aastrup *et al.* (2012), related to the request for UCC services. For instance, many of the receivers interviewed for paper III feared an increase in cost, and therefore used other types of solutions of doubtful cost efficiency. An increased cost efficiency is also relevant for municipalities. It may be, for example, important to show citizens that their tax money is being well spent (as noted in paper V).

Similar to the need above (providing high-quality customer service), this need has not been broken down into sub-needs. This is, however, an important need to highlight since any type of business must strive to be cost-efficient. This need encompasses most other needs, and meeting many of the previously described sub-needs improves cost efficiency.

5.1.3 Increasing the understanding of customer needs

The categorisation of customer needs, presented above, increases the understanding of the needs. During the analysis, several areas were identified that are worth addressing further. These areas encompass customer needs and further deepen our understanding of customer needs in general. Topics to be discussed include, for example, whether the results presented in the thesis are confirming or contradicting the previous work, what impact the categorisation have, and a suggestion for how to segment customers into groups.

Identified customer needs supporting literature

On a congregated level, the customer needs identified in this thesis have previously been described. This suggests that the most important customer needs have been identified. This identification can form the basis for recommendations for initiators of UCCs about the customer needs on which they should focus. Nevertheless, it is also important to seek new opportunities, and strive to satisfy needs that customers are not yet aware of (noted by Groth, 1994 and emphasised in paper V). Such a striving can take the form of either providing additional benefits for the customers of using the resources of UCCs more efficiently through economies of scale (paper V). Striving for better resource utilization and economies of scale can improve the economy of UCCs, while meeting latent needs of customers can make them more satisfied.

Identification of sub-needs provides more detail

This thesis proposes new ways to break down the needs and identify their characteristics, and in this way adds to the knowledge. The various needs and sub-needs become easier to understand when certain characteristics of them are described. These sub-needs can also provide further insights for UCC initiators about what it is important to focus on when addressing receivers. It may be particularly important to be aware of customer needs when starting up a UCC. The identification of the sub-needs may be beneficial also for receivers. It provides a more comprehensive view of the types of needs that UCCs can meet. This may help receivers to understand UCCs, and enables them to see the benefits they can gain. In other words, identifying and describing customer needs can be beneficial for both receivers and UCCs.

Furthermore, needs can be difficult to comprehend if presented to such stakeholders as receivers. Identifying and describing the sub-needs make this clearer and easier to relate to. Paper V, for example, shows examples where personnel at both receivers and UCCs were aware of certain sub-needs.

Sub-needs and the categorisation

As previously noted, the categorisation of needs can make it easier for suppliers to identify the type of need, and may provide guidance on how to meet them. For example, the categorisation of needs can provide more detail about them and separate more basic needs

from more advanced needs (Urwiler & Frolick, 2008). Meeting needs that have been categorised as supplemental or psychic may provide additional benefits than satisfying basic needs. The categorisation of needs can function as an important component in the work of UCCs to meet the needs of their customers. This can also potentially lead to improved understanding on how meeting certain needs affect the customers. However, it is not sufficient to only focussing on the categorisation, since it is also important to understand the customers, or at least be aware of their situation (paper II). This is important since the situation of the customers can affect the type of needs that are required. A customer who is experiencing problems, for example, will have different needs than one who do not (indicated in paper V).

Sub-needs and importance

It is also worth raise the question if all needs are equally important and if it is important to meet every need. Utility needs usually must be satisfied, but needs in the other categories may not be necessary to meet. However, the categorisation of needs should be viewed as an accumulative process, i.e. certain needs may be met before others. One example of this is the two sub-needs “reliable deliveries” and “shorter delivery times”, where is it often necessary to satisfy the need for reliable delivery times before reduce the delivery times. This phenomenon is highlighted also in paper V.

This raises the question of which needs to target, in particular, how to set priorities for needs that share characteristics. Meeting needs that have been categorised as supplemental or psychic can lead to additional benefits, and thus may raise customer satisfaction and acceptance of UCCs. The type of need is another way to identify which needs should be given priority. The findings in this thesis (paper III; paper V) suggest that priority should be given to needs that stem from some type of problems. For example, the lack of reliable deliveries was described as very important and viewed as a problem for receivers (paper III; paper V). The lack of reliable deliveries could lead to problems with the working environment (paper V). Meeting customer needs that are viewed as a problem may also improve customer attitudes towards UCCs. Customer needs such as short delivery times, and the use of external storage for special purchases were all mentioned by receivers (paper V), while these needs in general were not considered to cause major issues.

Different UCC customers

Previous research have highlighted that receivers are the customer group that can benefit the most from using UCCs. The results presented in the papers show that different types of receivers exist, such as retail stores, kitchens, offices, and therapists’ units (paper II; paper III; paper V). The results suggest that many of the needs identified are experienced by all types of receivers, regardless of whether the receivers are municipal receivers or not. Certain needs, however, such as the need to increase cost-efficiency and the need to provide high-quality customer service, are more relevant for businesses.

The other type of UCC customer is municipalities, and the conclusions from paper II highlight the importance of starting to consider them as UCC customers. Municipalities have often financed UCCs through subsidy (see e.g. Browne *et al.*, 2005), but considering municipalities as customers changes the situation. UCC customers pay for services that can meet needs, such as reducing the number of freight vehicles in urban areas. Considering municipalities as paying customers can thus create revenue for UCCs, which in turn help to ensure that UCCs are long-lived.

Needs of different receiver groups

How needs are viewed can be subjective and can depend on the viewer (customer). With this in mind, it is possible to identify groups of receivers that share similar characteristics with respect to customer needs. Tendencies of such groups have been identified in the papers presented in this thesis (mainly in paper III and paper V). The groups were identified based on how receivers viewed their needs, and the degree of variety of the needs.

On the one hand, some receivers were not as expressive about their needs. The needs they did mention were basic and were categorised as mainly utility needs (see examples in paper III and paper V). Furthermore, these receivers saw either no benefits or very few benefits of using UCCs (paper III; paper V). Such receivers were identified as a group, and given the name group 1.

Other receivers saw potentials and presented their needs in detail, and gave rich descriptions (further illustrated in paper V). Most of these receivers were “thinking outside the box” and mentioned needs the satisfaction of which could provide something extra for themselves and for their customers. In other words, they were more aware of how the business was functioning, and how it could affect their customers (as illustrated in paper III and paper V). For example, some respondents noted that an appearance of busyness created by conducting in-store logistics activities could affect the level of customer service for their customers (paper III). These receivers mentioned several needs, both basic needs and more advanced needs. Such receivers were identified as a group, group 2.

Based on the two above-mentioned types of receivers, the two identified groups are illustrated in Figure 5 below. There exist many ways to identify these groups, the segmentation should therefore be viewed as illustrating examples.

Figure 5. The receiver group related to customer needs

5.2 How customer benefits can be understood and described

The second research question focusses on how customer benefits can be described and understood. The benefits are addressed from a UCC perspective, i.e. what benefits can UCCs provide to their customers. The first part is to identify different types of benefits, which are denoted sub-benefits. Several of these with similar feature can be congregate. The final step is to categorise the sub-benefits identified. Categorising benefits provides a clearer distinction between the more concrete benefits and the ‘soft’ benefits (Levitt, 1980). Furthermore, identifying benefits that are intangible (and offering such benefits) may be crucial for suppliers, since these can offer customers something more than the core benefits (Homburg *et al.*, 2005).

5.2.1 Adapted framework for categorising customer benefits

The adapted framework for categorisation of benefits is based on the proposed framework that is presented in the frame of reference in this thesis, section 2.3.2. The framework initially had only two levels (tangible and intangible), and an extra level was subsequently introduced between these. This category is termed **mixed** benefits, since it contains both tangible and intangible benefits. The categories and the number of benefits identified are not what is most important. Instead, this section strives to identify different characteristics. The framework with the third level is presented below together with examples from logistics.

- **Tangible benefits** are benefits that are concrete and easy to measure and follow up. An example is that the deliveries arrive on time.
- **Mixed benefits** are a mix of tangible and intangible benefits. An example of this is deliveries arriving on time and that information about them is provided. The tangible aspects include the timing of deliveries, and these are easy to measure. However, the benefits related to receiving information about deliveries are more difficult to estimate.
- **Intangible benefits** are ‘softer’ benefits, and are often difficult to measure and more difficult to grasp (Levitt, 1980; Mudambi *et al.*, 1997). An example is meeting the same driver during deliveries.

5.2.2 Describing and categorising customer benefits

Several customer benefits were identified, each of them consisting of several sub-benefits (presented in *italics*). The categorisation is based on the papers in this thesis (shown as illustrative examples in tables below) and previous work on UCCs. The customer benefits identified are:

- Providing deliveries
- More efficient business operation
- Providing external storage
- Increased information
- A more attractive city
- ‘Simplicity’

Providing deliveries

Providing deliveries is an apparent benefit, since it is the core function of a UCC (Browne *et al.*, 2005). Providing deliveries is, in many cases, the principal reason to introduce UCCs. The results presented in paper II and paper V are very much in line with previous knowledge. The sub-benefits identified are *receiving deliveries*, *receiving deliveries on time*, *ability to request delivery times*, *receiving information about deliveries*, and *meeting the same driver*. Table 9 below presents these sub-benefits.

Receiving deliveries is easy to understand and has a very concrete meaning. This is a necessity for all types of businesses. It is also easy to determine whether the deliveries have arrived or not. This sub-benefit has thus been categorised as a **tangible** benefit.

Receiving deliveries on time is also concrete and relatively easy to evaluate. If deliveries do not arrive on time, problems for personnel can arise. Unreliable deliveries also cause uncertainties. This is not as important as receiving deliveries, but has even so been categorised as a **tangible** benefit.

Ability to request delivery times is similar to the sub-benefit above. Inappropriate delivery times can disturb not only personnel at the receivers but also other people, such as customers of receivers. It is also clear what the sub-benefit means and easy to understand. These characteristics led to the sub-benefits being categorised as a **tangible** benefit, although it does have some of the characteristics of a mixed benefit.

Receiving information about deliveries concerns information about what is included in the upcoming delivery, if anything is missing, and whether the delivery is late. This sub-benefit is not as concrete as the previous sub-benefits. Having information can mean different things to different receivers, and it might not always be viewed as a benefit. Even so, better information can make it easier for receivers to plan operations and adjust them if necessary. On the other hand, there is no guarantee that it is clear how the information provided should be used. Receiving information about deliveries has therefore been categorised as a **mixed** benefit.

Meeting the same driver is difficult to evaluate, and the way it is experienced may depend on the particular employee at the receiver. It may be important for certain employees but not for others. It is, however, easy to determine if the same driver delivers the goods, but it is difficult to evaluate the benefits and what they mean. For this reason, it has been categorised as an **intangible** benefit.

Table 9. Providing deliveries, overview of the benefit with illustrative examples

Sub-benefit	Categorisation	Illustrative examples
Receiving deliveries	Tangible	<ul style="list-style-type: none"> • It is clear whether a delivery has been fulfilled or not (paper II; paper V)
Receiving deliveries on time	Tangible	<ul style="list-style-type: none"> • Delivery times are much more reliable when they come from the UCC (paper V) • Even if the reliability was not currently measured, it would be possible to do so (paper V)
Ability to request delivery times	Tangible	<ul style="list-style-type: none"> • It is possible for receivers to steer transports away from inappropriate times (paper V)
Receiving information about deliveries	Mixed	<ul style="list-style-type: none"> • The quality of transport information is better with the UCC (paper II) • The benefits that are realised depend on what use is made of the information (paper II)
Meeting the same driver	Intangible	Not identified from the papers

Previous work has shown that receiving deliveries is very important (see e.g. Browne *et al.*, 2005). Receiving deliveries on time improves to a certain extent when UCCs are used, since delivery distances are shorter than they are when a standard distribution system is used

(Allen *et al.*, 2012). Aastrup *et al.* (2012) also note that receiving deliveries on time and requesting delivery times can lead to many other benefits for receivers. Better and more information can be enabled in UCC systems, since UCC can facilitate information sharing (Browne *et al.*, 2005; BESTUFS, 2007). Further, UCCs usually have some type of inventory system, which receivers do not always have themselves (Aastrup *et al.*, 2012). Meeting the same driver can make the recipient feel more secure (Gammelgaard *et al.*, 2016). The empirical results presented in this thesis generally agree with previous work, but add examples of what the benefits can lead to, especially the benefits related to how information can be used.

More efficient business operation

A more efficient business operation can be a benefit for any receiver, but most of the benefits that UCCs can provide is directed to retail stores (Browne *et al.*, 2005; Aastrup *et al.*, 2012). Other receivers who may benefit are kitchens or physiotherapist therapists' units (paper V). The identified sub-benefits are *lower costs*, *easier planning of personnel*, *improved working environment*, and *better customer service*. Identified sub-benefits are presented in Table 10 below.

Lower costs mean that receiver can reduce cost by using UCCs, i.e. a business total cost can be decreased. A cost reduction is very concrete and easy to evaluate. It is therefore categorised as a **tangible** benefit. Even though the sub-benefit is concrete, the reason for the cost reduction might not always be as evident. This is somewhat related to the sub-need below, easier planning of personnel, which can lead to cost reductions.

Easier planning of personnel describes the ability to plan how many personnel need to be present at certain times and what activities to perform. The number of deliveries and the availability of information can affect this. The ability to adjust the number of workers is concrete and easy to understand. It may also mean that the right competence is present at the right time. The sub-benefit has therefore been categorised as a **tangible** benefit. Note that even though this has been categorised as a tangible benefit, it may still be difficult to plan, and may depend on the type of information used to make the decision.

Improved working environment includes reduced stress for personnel, fewer disturbances for personnel, and knowing whom to contact if a problem arises. This sub-benefit is not as concrete, and it is difficult to measure, for example, lower stress. A reduction in the number of interruptions, in contrast is easy to measure. For this reason, the sub-benefit has been categorised as a **mixed** benefit.

Better customer service describes, for example, the ability of UCCs to simplify certain receiver activities, or allow them to move these activities to the UCC. This enables personnel at the receivers to provide better customer service (for example, by increasing presence on the sales floor). An improved customer service is another benefit that is difficult to grasp,

although it can be estimated. Further, it is not always clear how improved customer service is beneficial for the receivers. The sub-benefit is not in general viewed as concrete, but rather abstract. It has for these reasons been categorised as an **intangible** benefit.

Table 10. More efficient business operation, overview of the benefit with illustrative examples

Sub-benefit	Categorisation	Illustrative examples
Lower costs	Tangible	<ul style="list-style-type: none"> • Potential to reduce costs due to the furniture service that the UCC provides (paper V)
Easier planning of personnel	Tangible	<ul style="list-style-type: none"> • It is easier for the personnel at receivers to plan, since they receive fewer deliveries and more information (paper V)
Improved working environment	Mixed	<ul style="list-style-type: none"> • Reducing stress for personnel in kitchens was one selling point when introducing the UCC (paper V) • The working environment has been much improved since the UCC handles transfers between units (paper V)
Better customer service	Intangible	<ul style="list-style-type: none"> • Being occupied with activities in the store can reduce the perceived customer service (paper III)

A potential benefit for receivers is a reduction in costs, achieved by moving certain activities from the unit to the UCC (Browne *et al.*, 2005). In itself, this simply moves the cost from one place to another, however, if the activity can be performed more efficiently a reduction can arise. Aastrup *et al.* (2012) and Browne *et al.* (2005) also noted that letting UCCs handle certain activities can free up time for personnel at the receivers, who could then use the time to provide better customer service. Another way in which using UCCs can ease the work at the receivers is by enabling a reduction in the number of deliveries (Gammelgaard *et al.*, 2016). Fewer deliveries and better information about deliveries also make it easier to plan staffing (Aastrup *et al.*, 2012). Finally, UCCs can improve customer service in that product availability is higher if storage is used at UCCs (Browne *et al.*, 2005). The empirical results presented in this thesis provide illustrating examples from other contexts than only retail stores.

Providing external storage

Providing external storage is also an apparent benefit, since UCCs are a type of terminal and often have storage space available (Browne *et al.*, 2005; Aastrup *et al.*, 2012). The external storage at UCCs can also enable other benefits (Browne *et al.*, 2005). Paper V highlights this, where the terminal studied had a storage space, but it was mainly used for long-term storage. The identified sub-benefits are, *storage during peak periods*, *using external storage*, *inventory system*, and an *increase in product assortment*. Table 11 below presents the sub-benefits and the categorisation.

Storage during peak periods can be used during, for example, a large temporary increase in sales volume. Having access to external storage is a concrete benefit for receivers, which is

relevant for shorter periods. Access to a temporary storage can be beneficial for receivers during sales peak, since it can allow receivers to have larger stock close by and thereby potentially reduce the risk of loss of sales. For this reason, the sub-benefit has been categorised as a **tangible** benefit.

Using external storage at UCCs in the short or long term is a further benefit. Moving storage capacity from a receiver to a UCC makes space available at the receiver, which is a concrete benefit. However, the benefits of space freed in this way can be difficult to estimate, and depends on how it is used. It could, for example, be used to increase the sales area. Despite this, the sub-benefit has been categorised as a **tangible** benefit. This is a case where the sub-need is close to two categories. Offering space is concrete, however, how the benefits can be estimated is not as clear. The difference of this sub-need compared to storage during peak periods is the uncertainties on how to use the external storage outside peak periods.

An *inventory system* makes it possible to keep track of where products are and to provide better information to the receivers about deliveries. This sub-benefit is relatively concrete in cases in which receivers did not have an inventory system before. However, for receivers with a functioning inventory system, this might not be a benefit. Furthermore, there are also uncertainties how receivers should use the information. The sub-benefit has thereby been categorised as a **mixed** benefit.

An increase in product assortment can be achieved if external storage is used to store duplicates of products, reducing in this way the stock of each product at the receivers. An increase in the assortment can be positive and it is difficult to estimate what benefits it can yield. It may, for example, lead to an increase in sales, but may result in certain products becoming sold out. For this reason, the sub-benefit has been categorised as an **mixed** benefit.

Table 11. Providing storage, overview of the benefit with illustrative examples

Sub-benefit	Categorisation	Illustrative examples
Storage during peak periods	Tangible	Not identified in the papers
Using external storage	Tangible	<ul style="list-style-type: none"> • The UCC is used to store beds and healthcare equipment (paper V)
Inventory system	Mixed	<ul style="list-style-type: none"> • Keeping track of the location of products have led to large cost reductions, since procurement of products have been reduced (paper V)
An increase in product assortment	Mixed	Not identified in the papers

Browne *et al.* (2005) described the use UCCs for external storage, and Lin *et al.* (2016) describe how storage can be moved from the receivers to UCCs to free up space.

Furthermore, Aastrup *et al.* (2012) also mention that UCCs can enable more information sharing if an inventory system is used. Another benefit related to more storage is the ability to use the storage during peak periods such as Christmas (Browne *et al.*, 2005). An increased product assortment is another benefit that is highlighted by Browne *et al.* (2005). The results from the appended papers provide examples of the sub-benefits, although previous work has identified most of the characteristics used to categorise the sub-benefits.

Increased information

Increased information is a benefit that can be enabled when UCCs are used (Browne *et al.*, 2005; BESTUFS, 2007). As previously noted, the increase is made available mainly through the use of an inventory system. It can be a benefit for receivers (Browne *et al.*, 2005) (including municipal units) and for municipalities (paper V). For receivers, the sub-benefits provided by increased information are similar to some sub-benefits already mentioned, such as use of an inventory system and easier planning of personnel. Sub-benefits for receivers are therefore not described. The identified sub-benefit identified and discussed below, therefore, are only directed to municipalities: *increased information (municipalities)*. Table 12 below presents the sub-benefit.

Increased information (municipalities) can include information about deliveries, delivery costs and purchasing costs (if the purchased product passes through a UCC). The benefits are not always clear, because it may not be clear what type of information is important or what use to make of the information. However, it can provide many benefits, such as calculate the potential reduction in driven kilometres and used when negotiating cost for transports. The sub-benefit has therefore been categorised as a **mixed** benefit.

Table 12. Increased information, overview of the benefit with illustrative examples

Sub-benefit	Categorisation	Illustrative examples
Increased information (municipalities)	Mixed	<ul style="list-style-type: none"> • The purchasing cost has been considerably reduced due to the municipality being able to keep track of what is purchased (paper V) • The transport cost was reduced, since the municipality can calculate driven kilometres and have a factual basis for negotiation with suppliers (paper II; paper V)

A more attractive city

A more attractive city is a benefit that is mainly directed to municipalities. The use of UCCs can improve the efficiency of last-mile deliveries, and in this way lead to a more attractive city (Allen *et al.*, 2012; Gonzalez-Feliu *et al.*, 2014). The results presented in paper II and paper V support this. These results show that the number of delivery stops has been heavily reduced, as has also the driven kilometres (by freight vehicles) after the introduction of UCCs. This was a driving force to introduce the UCCs in several cases described in paper

II. The identified sub-benefits identified are: *reduced number of stops*, *less emissions*, *less traffic congestion*, *less noise*, *good publicity*, and *better security*. Table 13 below presents the sub-benefits.

Reduced number of stops is easy to measure and is a relatively clear benefit. It is also evident what it means. A reduced number of stops means fewer vehicles parked on streets, at loading docks, and in public spaces. The sub-benefit has been categorised as a **tangible** benefit.

Less emissions is a benefit that is usually not easy to measure, mainly due to uncertainties about how it should be measured. This benefit is often a consequence of reducing the number of freight vehicles. Less emissions can also be a consequence of using smaller distribution vehicles, something that the use of UCCs enable. Since it is, in general, unclear how to estimate emissions, this sub-benefit has been categorised as a **mixed** benefit.

Less traffic congestion is a benefit that stems from a reduction in the number of freight vehicles. This sub-benefit lead to less vehicle in urban areas and less freight vehicles parked in, e.g. public spaces. Similar to the sub-benefit above, it is not as easy to measure this sub-benefit since it is often unclear how to measure it and the method can vary. This sub-benefit is not as a strictly concrete benefit, as has for this reason been categorised as a **mixed** benefit.

Less noise is a sub-benefit that also stems from a reduction in the number of freight vehicles. The same arguments as that presented above apply to this sub-benefit: it is difficult to measure and evaluate. Thus, it has been categorised as a **mixed** benefit.

Good publicity is a benefit that could be experienced by all stakeholders that are connected to UCCs, if UCCs are viewed as environmentally friendly initiatives. Good publicity is positive, but it is often very difficult to evaluate what it is worth. For this reason, the sub-benefit has been categorised as an **intangible** benefit.

Better security is a sub-benefit associated with a reduced risk of accidents, mainly around schools. People in urban areas can also feel more secure. This is not less important than the other benefits, but is more difficult to grasp and more difficult to measure. With this in mind, the sub-benefit has been categorised as an **intangible** benefit.

Table 13. A more attractive city, overview of the benefit with illustrative examples

Sub-benefit	Categorisation	Illustrative examples
Reduced number of stops	Tangible	<ul style="list-style-type: none"> • It is easy to measure the number of stops (paper V) • It is easy to communicate the reduction of stops to the citizens and the municipality (paper V)
Less emissions	Mixed	<ul style="list-style-type: none"> • The emissions have decreased, but the amount of decrease has not been estimated (paper V)
Less traffic congestion	Mixed	<ul style="list-style-type: none"> • Less traffic congestion is a benefit; however, it is not measured right now (paper V)
Less noise	Mixed	<ul style="list-style-type: none"> • Less noise is not measured but it has been reduced (paper V)
Good publicity	Intangible	<ul style="list-style-type: none"> • Some services are possible only because the UCC is viewed as environmentally friendly (paper II) • Reducing environmental footprints is a benefit that can yield good publicity (paper IV) • Good publicity is important, it is important to show that the taxpayers' money is used well (paper V)
Better security	Intangible	<ul style="list-style-type: none"> • The risk for accidents, mainly around schools, has decreased (paper V) • Better security is very important, but the only parameters measured are the number of stops and driven kilometres (paper V)

Reduced number of stops and less traffic congestion are probable benefits of introducing UCCs, and are often driving factors for the process (Browne *et al.*, 2005; BESTUFS, 2007). Browne *et al.* (2005) also describe a reduction in noise as a benefit. In contrast, van Rooijen and Quak (2010) did not observe this in their evaluation of a UCC. Furthermore, UCCs can enable a shift to more environmentally friendly vehicles (Browne *et al.*, 2005). A safer environment around schools was identified by Björklund and Gustafsson (2015). The results presented in this thesis are in line with previous work regarding the identified sub-benefits. However, the results presented here show new characteristics of the sub-benefits.

‘Simplicity’

Simplicity describes benefits that make things easier for receivers (that has not previously been mentioned), and that arise from the use of a UCC (noted in paper V). The sub-benefits identified are related to the UCC operation and is enabled since the main focus of UCCs is to serve receivers. The identified are *fast feedback* and *specific contact person*. Table 14 presents the sub-benefits and categorisation.

Fast feedback describes the feedback received from UCCs by receivers. Receivers can contact the UCC if there is a problem, a request, or other concern. This sub-benefit is concrete, but usually not the most important benefit. It has been categorised as a **tangible** benefit.

Specific contact person describes the fact that the UCC is mainly the party to contact when the need arises. When a UCC handles most supplies, it becomes the counterpart to contact, and it is not necessary to contact a specific supplier. This sub-benefit is concrete and receivers know whom to contact. This can result in less time spent for receiver on contacting multiple supplier. The sub-benefit has therefore been categorised as a **tangible** benefit.

Table 14. Simplicity, overview of the benefit with illustrative examples

Sub-benefit	Categorisation	Illustrative examples
Fast feedback	Tangible	<ul style="list-style-type: none"> • The receivers always have someone to contact with the UCC (paper V) • The UCC gives priority to supplying fast feedback to receivers (paper V)
Specific contact person	Tangible	<ul style="list-style-type: none"> • Instead of constantly having to contact several suppliers, receivers mainly have to contact the UCC (paper V) • The UCC is the first place to contact if there are any issues (paper V)

5.2.3 Increasing the understanding of customer benefits

The identification and categorisation of benefits and sub-benefits are the first steps towards answering the second research question, and contribute to the understanding of customer benefits. The next step is to focus on certain areas that span throughout all the identified benefits.

Confirmation and extension of previous work

The results presented in the papers support previous work into UCCs to a large degree. However, the results extend previous research by providing examples of new benefits and more detailed descriptions. The work presented above compliment studies by, for example, Aastrup *et al.* (2012), Gammelgaard *et al.* (2016), and van Rooijen and Quak (2010). However, the work identifies additional sub-benefits, such as *faster feedback* and *simplicity*. The UCC perspective has been applied more extensively, compared to the customer perspective. Hence, most of the sub-benefits identified in the previous section had been identified in the literature. However, the analysis presented in this chapter provides the categorisation and, in this way, increases the understanding of the benefits. Identifying and describing the benefits can help to better understand UCCs and the benefits that they can offer to both receivers and to municipalities. It may, for example, not be immediately evident that UCCs can provide benefits such as an improved working environment. Indeed, receivers might not even consider this aspect. Highlighting these benefits can improve the opinion of UCCs that customers have. A better understanding of benefits can also affect how these benefits should be communicated. Also, whether different communication strategies should be chosen for different customers (as indicated by Gammelgaard *et al.*, 2016).

The importance of different benefits

It is interesting to consider which benefits are more important and how the categorisation matters. Such considerations may affect the choice of how to communicate the benefits, something indicated by Gammelgaard *et al.* (2016). For example, tangible benefits are concrete and easy to measure, while intangible ones are more abstract (Levitt, 1980; Khalifa, 2004). It may be easier to communicate the more tangible benefits to the customers, since these benefits are easier to grasp, as shown exemplified in paper IV. However, it can differ whether the customer is a receiver or a municipality.

Receiver perspective

One of the most important benefits for receivers was that they could reduce costs (indicated in paper III). However, it was also very important to address other benefits, in particular how the use of a UCC can improve the working environment at the receivers and reduce stress for personnel (paper V). The potential cost reduction was evident also in paper II, and encompassed several of the critical factors identified in the paper. It was also noted that many of the benefits that UCCs can offer can reduce cost for receivers indirectly (see e.g. van Rooijen & Quak, 2010; Aastrup *et al.*, 2012; Gammelgaard *et al.*, 2016). Even if it is important to highlight other benefits that UCCs can provide, it is probable that the financial aspect will be most important, as concluded in paper III and paper V. It is interesting to note that the money question was raised also in paper V, despite this paper having studied a municipality-driven initiative. Even so, it is likely that the financial aspect is more important in a commercially driven initiative (indications of this is presented in paper III). In extension, when addressing potential benefits for receivers, it is important highlight a range of benefits, but in the end how they relate to potential cost savings.

Municipality perspective

The potential to reduce costs could also be an important benefit for municipalities (paper II; paper V), to show that tax money is being used efficiently. However, examples were seen in which the UCCs were allowed to increase costs, provided other goals were achieved (mainly environmental goals) (paper II). In cases in which a municipality was involved, societal benefits (such as a greener and more attractive city, and better security around schoolyards) were viewed as important and driving factors (paper II; paper V). Even if financial aspects are important for municipalities, the results from paper II clearly show that other types of benefits are at least equally important (something also described in paper V).

The benefits considered to be important for receivers and municipalities differ. Some of the benefits were categorised as tangible (such as a reduction in costs), some were categorised as mixed (such as improvements in the working environment), and some were categorised as intangible (such as better security). In other words, there were no clear signs

if certain categories of benefits are more important than others. This also applies to which benefits to communicate to the customers. Instead, the communication of benefits should be adapted to the customer (and the particular goals of the customer), something that was identified in both paper II and paper V.

Why the categorisation matters

The previously mentioned results indicate that the categorisation of benefits might not reflect their importance. However, the categorisation of benefits is important, since it creates a deeper understanding of the benefits and emphasises that different benefits can be important for different customers (Levitt, 1980). Homburg *et al.* (2005) showed that extra benefits can affect the overall perception that customers have of a supplier. In this context, intangible benefits are something extra, and can increase the benefits experienced by customers, compared to mainly tangible ones. In contrast, tangible benefits are more concrete and can be aimed towards a wider customer base. This suggests that it may be more important to highlight such benefits during the implementation phase of UCCs, especially if customers' situation is not known. Thus, it may thereby be necessary to consider the customer perspective in order to take full advantage of the categorisation.

5.3 Suggesting ways to increase customer benefits

It is crucial for UCCs to increase customer benefits. In this way, they increase the likelihood that customers are satisfied and have a positive view of UCCs. Customers with positive views of UCCs are also more likely to pay for UCC services. It is, therefore, interesting to identify ways in which the benefits for customers can be increased. Paper II, paper III, and paper V show that the benefits that UCCs can offer may differ from the benefits that customers perceive (also indicated in Aastrup *et al.* 2012 and in Gammelgaard *et al.* 2016). It is also possible that customers expect something that is not provided by UCCs (paper II; paper V). To summarize, two separate issues that can affect experienced customer benefits negatively have been identified in the papers and previous work on UCCs:

- **A difference between offered benefits (by UCCs) and perceived benefits (by customers).** This occurs, for example, when some of the benefits offered are not noticed by the customers or not viewed as benefits.
- **A difference between potential benefits and offered benefits** This occurs, for example, when customers request something that UCCs do not offer.

5.3.1 Difference between offered benefits and perceived benefits

One issue that can prevent customers perceiving benefits is a difference between what the customers perceive as benefits and the benefits that are offered. Customers may not be aware of the benefits that UCCs can provide (paper III; paper V). Another aspect is if they concentrate on the cost of using UCCs without considering the current cost (paper III;

paper V). In other words, the difference between benefits offered and the perception of benefits may be due that *customers are not aware of potential benefits* and that *customers lacking a holistic view*. Ways identified in both areas can function as how to increase experienced customer benefits and thereby reduce the gap between offered benefits and perceived benefits.

Customers not aware of potential benefits

Previous work has shown that a gap exists between the potential benefits that UCCs provide and the benefits that receivers perceive. Aastrup et al. (2012), for example, showed that most receivers did not requested UCC services even though they could lead to numerous benefits (see e.g. Browne et al., 2005; Allen et al., 2012). Nordtømme et al. (2015) showed that problems rather than potential benefits were noted by receivers. Paper III and paper V demonstrated the same effect. One important conclusion from paper III is that most receivers were hesitant to use services, even if such services could ease their working situation and provide other benefits. There was also a clear gap between the benefits that UCCs can provide (according to the managers) and the benefits that the receivers noted (paper V).

Unawareness of the benefits that UCCs can provide may affect the overall evaluation that receivers have of UCCs, and may be a reason that some initiatives fail. It is, therefore, important to address this gap. A further barrier arises if UCCs are not aware of customers expectation. Understanding the needs of receivers and meeting the most significant ones for UCCs can be an important step (as illustrated in paper V). Another way to reduce the gap is to improve communication from UCCs, and to highlighting the benefits that UCCs can provide (indicated in paper II; paper V). Thus, the unawareness of customers can be alleviated by actions in two areas of potential improvements: *understanding* and *communication*.

Improvement area: Understanding

Understanding the needs of customers

One way to understand the UCC customers and to satisfy them is to understand their needs. Understanding the needs goes beyond simply knowing what these needs are, it is also necessary to know the type of need (e.g. how they can be categorised). By knowing the problems with the working environment (paper V), managers from the UCC could address this issue and thereby solve a problem for the receivers. Paper V describe situations in which the operative manager visits the receiver to obtain a better understanding of the operation there. Regular meeting between representatives from UCCs and representatives from receivers can also help understanding to grow (paper II; paper V). One reason for such meetings is to be able to better customize the UCC operation to the needs to the receivers. Most previous studies lack this perspective, and describe how UCC can sell services before understanding what receivers are requesting (see e.g. van Rooijen & Quak,

2010), or exploring which services are requested. In such situations, the services mainly stem from the UCC perspective and not the customer perspective (e.g. Aastrup *et al.*, 2012).

Expertise in logistics also helps personnel at UCCs to understand the needs of customers, and to identify needs of which the customers are not aware of. The conclusions in paper II and paper V show that it is crucial that the UCC employs personnel with expertise in logistics. In a wider context, having such expertise can make it easier to identify needs that UCCs can meet, which can lead to increased benefits for the customers. This expertise can also make it easier to identify resources that can be used more efficiently at the UCC (identified in paper V).

Understanding priority to certain needs

UCC must give priority to meeting needs categorised as utility needs, since they are usually essential for the daily operation of the customers. After this, it may be possible to identify differences between needs with different categorisations. It is important to consider this factor, since meeting more advanced needs can give greater extra benefits. (Khalifa, 2004). The analysis of RQ1 presented above led to the conclusions that focussing on needs that stem from a type of problem should be given priority. Furthermore, the needs that were viewed as problems were categorised differently. This implies that the categorisation of the needs should not be the top priority. However, a different conclusion may be reached if customer groups are considered (discussed below). It is also worth considering whether all needs should be met. The answer is “Yes” from a customer perspective, but this is usually not possible due to cost.

A summary of the improvement area with the two identified aspects (understanding the needs of customers and what needs to focus on meeting) is illustrated in Figure 6 below.

Figure 6. Summary of the first improvement area with its two aspects

Improvement area: Communication

Communicating the offer

One important way to improve the understanding of UCCs by customers is for personnel at UCCs to inform the customers how using a UCC can affect them. The papers in this thesis and previous work (see e.g. Aastrup *et al.*, 2012) have shown clearly that

understanding is deficient. For example, the results presented in paper III shows that being unaware of the positive effects UCC services can affect how these services are viewed. This can in turn lead to a negative view of UCCs, something that is often viewed as a problem (see e.g. Nordtømme *et al.*, 2015). The receivers interviewed for paper V, in contrast, were more positive, and most were aware of how using the UCC led to benefits for them. One reason for this is work carried out by the UCC managers. The managers, for example, put a great deal of effort into communicating the benefits that a UCC could provide, even if these benefits were not estimated (paper V). Furthermore, continuous communication is also viewed as important and this was mentioned by both receivers and personnel at the UCC (paper V). The main arena in which continuous communication took place was meetings between responsible personnel from the UCC and representatives from the receivers (paper V). This was also put forward in paper II, and having an organised counterpart to communicate with was viewed as a critical factor for a successful UCC. This makes sense, since a lack of time makes it seldom possible for UCC operators to communicate with all receivers all the time.

Communicating different benefits

The categorisation of benefits can help to set priorities among benefits to communicate. Tangible benefits are important, while intangible benefits might have a greater effect on the way in which customers evaluate a supplier (Khalifa, 2004; Homburg *et al.*, 2005).

Communication about concrete (tangible) benefits is important since it provides an easy way to understand them. The results presented in paper IV highlight the importance of showing concrete benefits to stakeholders. The results presented in paper III and paper V support this. One example from Paper III showed that, for example, receiving delivery on time (categorised as a tangible benefit) was a subject of much interest. Managers at the UCC also noted that it was important to highlight this benefit (paper V). Another tangible benefit that the respondents considered to be very important is the potential for cost savings when using UCCs (paper III; paper V). However, the results in paper V show that it was also important to highlight intangible benefits, such as improvement in the working environment with less stress. This was even the most important benefit to highlight by the UCC (paper V). It is interestingly to note that personnel at the UCC were aware of problems with the working environment at the receivers when the UCC started. Because of this, the personnel gave considerable emphasis to improvements in the working environment. The results thereby indicate that it is important to also understand the needs of the customers, not just the benefits offered. Tangible benefits are easier to identify and communicate, while it is necessary to understand the customers' situations to know which intangible benefits are important for them. Aastrup *et al.* (2012) found that interest in UCC services was very low, which may be a consequence of an inability to understand the customers' situations. It is worth noting that tangible benefits may also depend on the situation of the customer,

but to a lesser degree. This is because such benefits are more concrete and are suitable for most types of receivers.

Communication to different customer groups

This improvement area can also be related to the customer groups proposed in section 5.1.3. The first group mainly had needs that were basic needs and relatively few needs. The second group had more advanced needs. (It is worth noting that the groups are to illustrate differences, and not an exact division of groups).

With inspiration from Khalifa's (2004) framework, benefits from UCCs can be related to the customer needs. Thus needs that have been categorised as utility needs correspond more closely to benefits that have been categorised as tangible benefits (Khalifa, 2004). Similarly, needs that have been categorised as psychic needs correspond more closely to benefits that have been categorised as intangible benefits. Some of these tendencies have been identified in the papers of this thesis. Customers in the first group (those with more basic needs) were more aware of more tangible benefits, while those in the second group (more advanced needs) were more aware of intangible benefits. This relation can be illustrated and it is shown in Figure 7 below. A general statement based on the framework is that customers in group 2 experience additional benefits, and are thus more positive towards UCCs. UCCs should thereby strive to bring customers to the top right-hand corner of the figure.

Figure 7. The groups defined by categorisation of customer needs and customer benefits

Different areas of improvement may be more important for different groups. To exemplify, receivers that are not aware of benefits with the use of UCCs (bottom of the arrow) are

5 Analysis and Discussion

more reluctant to use UCCs (tendencies have been identified in paper III and to a degree in paper V). It is more important to show the more basic and tangible benefits to these receivers, and explain how the use of a UCC can affect their operation. It is not as important to communicate basic benefits to customers who lie towards the top of the figure, since they are already aware of these benefits (see examples in paper V).

Receivers who are located close to the centre of the figure are somewhat aware benefits that UCCs can provide. Even so, finding ways to increase the benefits they experience may be important, especially if this experience increases their willingness to pay. Since receivers in the middle are more aware of the basic benefits, the focus should be to communicate more advanced ones that can meet more abstract needs. It may be more important to offer new services, and focussing on meeting the latent needs of this group.

A summary of improvement area with the three identified aspects (how to communicate the offer, what benefits to communicate, and communication to different groups) is illustrated in Figure 8 below.

Figure 8. Summary of the second improvement area with its three aspects

Lack of holistic view

This point is somewhat related to the point above (*not aware of potential benefits*), but further focusses on the lack of a holistic view regarding the potential of UCCs. This has been a major issue for UCCs that affects the way in which customers evaluate UCCs, and their willingness to pay for UCC services (Browne *et al.*, 2005). This was also an important conclusion of paper III and indicated in paper V. One reason for the low interest in services that UCCs could offer was the fear that the costs would increase (paper III). An important interpretation of this is that the respondents were often unaware of the potential benefits. This can potentially be explained by that receivers, to some extent, covered problems with cost-inefficient solutions (paper III). In other words, they were not aware of the costs involved in *not* using a UCC. This type of sub-optimisation has been identified in previous work on UCCs, and the work presented in paper I. Similar characteristics were also found in the work described in paper V: several respondents stated that the costs of using the UCC were high and this reduced their positive assessment of it. This is interesting, since all of the managers associated with the UCC noted that the costs for receivers had fallen since

introducing the UCC. The results from the papers imply that receivers needed to take a more holistic view – to consider the money spent for other solutions and compare this to the costs when UCCs perform certain activities. Moving activities from receivers to UCCs can reduce the total costs, due to economies of scale (Browne *et al.*, 2005; Aastrup *et al.*, 2012). The improvement area that has been identified is thereby **holistic view**.

Improvement area: Holistic view

Most of the factors that help receivers to become more aware of the broader system and avoid sub-optimisation have been described. One area of improvement that can be further highlighted here is communication. UCC operators can communicate with receivers and show them a clear overall cost analysis. The cost analysis can either be for certain activities or for the whole system. This has been partly performed at the UCC described in paper V. The calculations for all new services are based on a cost-benefit analysis. However, this is only from the perspective of the UCC and do not take the perspective of the customers into account. Another factor that helps receivers recognise a more holistic view is to increase their understanding of the UCC operation. They can be shown what the UCC actually does, how the operations functions, and how UCCs can benefit receivers. Paper V illustrates how this can be achieved, one component of which are study visits by receiver to the UCC. The receivers viewed it as positive and the ones who had experienced it stated that they gained a better understanding of the UCC operation. This has not been described previously, and this finding thus adds to the UCC literature.

Another way to encourage receivers to take a holistic view is to increase their expertise and knowledge. As previously noted, the possession of logistics expertise at the UCC is important, but it may also be so at the receivers. This expertise can be gained through, for example, closer interaction between UCCs and the receivers. This was partly identified in paper V, where study visits for receivers at the UCC were important. Expertise can also be transferred through communication between personnel at UCCs and receivers (paper II). The examples indicate the possession by receiver of logistics expertise increases their understanding, and helps them to identify how UCCs can provide other benefits.

A summary of improvement area with the two identified aspects is illustrated in Figure 9 below.

Figure 9. Summary of the third improvement area with its two aspects

5.3.2 Difference between potential benefits and offered benefits

The areas for improvements discussed in the previous sections mainly concerned how to reduce the difference between the benefits offered and perceived benefits. However, a difference can also be from the perspective of customers, where the customers see potential benefits that are only partially met or not met at all by UCCs. In this case, UCCs may need to develop new services to satisfy the customer needs. This effect is closely related to *understanding the needs of customers* above, but place more focus on how UCCs can innovate and add services that are directed to specific customer needs. In other words, this improvement area (developing new services) target UCCs. Paper II and paper V show that an unceasing striving to innovate and find ways to provide benefits to customers is critical. Two enabling factors for this have been identified above (communication and understanding), but discussion about communication can be further developed. Many of the receivers had needs that UCCs could meet, but, most of the needs were not communicated to personnel at the UCC (paper V). The operative manager at the UCC in the same paper confirmed this. The manager also described that personnel at the UCC were in general not aware of other potential needs, nor did they have any formal way of gaining this awareness. Instead, most of the new services that the UCC introduced arose after inefficiencies had been identified, or a potential to achieve greater economies of scale were recognised at the UCC. This is not a bad thing; but it does not consider the perspective of the receivers. The improvement area is illustrated in Figure 10 below.

Figure 10. Summary of the fourth improvement area

5.3.3 Overview of results from RQ3

The third research questions addressed how the benefits for customers can be increased. Mainly two main differences have been identified that can affect benefits: difference between offered benefits and perceived benefits, and difference between potential benefits and offered benefits. An overview of the results from the third research question is illustrated in Figure 11 below. The figure includes the different improvements areas and the identified ways on how customer benefits can be increased.

Figure 11. Summary of the analysis and discussion of the third research question

5.4 Reflection on the analysis and discussion

5.4.1 Wider implications for society

Much of the analysis has been related to the needs and benefits for receivers. This group usually has more evident needs, and the financial aspects are more important to it. However, it is crucial to further highlight the implications for society and the urban environment. This is important, not only because municipalities can be viewed as financial contributors to UCCs, but also because it is important to improve the urban environment since this is often viewed as a problem. Using UCCs could both reduce the environmental footprints of those who use the facility and provide good publicity. Good publicity is an important consideration also for private companies. Paper IV showed that such benefits are crucial in a similar distribution system. Besides improving urban environment, introduction of UCCs, can also lead to lower energy consumption. Furthermore, initiatives that are viewed as environmentally positive are likely to receive recognition (paper IV), which can increase the positive views of UCCs (indicated in paper V).

The main benefits that the use of UCCs can lead to have already been mentioned in section 5.2. Some of these are related to effects on the urban environment. Nevertheless, the use has other potential benefits that can affect municipalities and people living in the municipality. One benefit (which mainly arises in cases in which a municipality is involved in the UCC operation) is to offer short term work for unemployed people (paper V). This is viewed as a benefit also in a similar distribution system (paper IV). Using UCCs in such a way and providing working opportunities are valuable for society (indicated in paper IV and paper V). Another benefit, described in paper V, is that UCCs can be used in case of emergency, to support citizens with items such as food for a couple of days. It was emphasised that this can provide a sense of security for the citizens (paper V).

5.4.2 Benefits for other types of receivers

The analysis presented above has considered receivers who were included in the empirical studies in this thesis (e.g. retail stores, kitchens, physiotherapist units). However, the results may apply to other types of receivers, especially in systems that are similar to UCCs. One example is the use of UCCs during building projects, where the receivers are often building sites. Increasing customer satisfaction is important for any type of organisations, and the results presented here can thereby provide important insights.

6 Conclusions and Contributions

The first section of this chapter presents the conclusions of the thesis. This section addresses answers to each research question in sequence, and ends with addressing the purpose of this thesis. The subsequent sections present the contributions to both research and practice. The final section of this thesis elaborates on suggestions for future research.

6.1 Conclusions

The purpose of this thesis was to deepen the understanding of benefits for the customers of UCCs. Addressing both customer needs and benefits that UCCs can provide are important steps towards this.

This thesis provides a deeper understanding of customer needs, not only on an overall level, but especially on a more detailed level by identifying sub-needs of each need. On an overall level, the customer needs identified in the papers largely agree with those identified in previous work on UCCs. This suggests to that the most important needs have been identified. The customer needs identified on an overall level are: *receiving goods, reducing the number of freight vehicles in urban area, reducing disturbance of personnel, storage, extra handling, providing high-quality customer service, and an increased cost efficiency*. New sub-needs have been identified that had not previously been mentioned in the research area, and the work here thus expands the knowledge. The new identified sub-needs include, *using external storage for larger purchases and for special purchases, and need for extra distribution*. The identification of needs can be a basis to determine what is important for UCCs to target in order to satisfy customers. Some of the identified needs can be met by UCC resources that are usually already in place (such as storage space). Meeting these needs could increase economies of scale for UCCs and lead to more satisfied customers. Categorising the needs has allowed different characteristics of the needs to be highlighted, which makes them more comprehensible and deepens the understanding. Categorising the sub-needs makes it, for example, possible to segment the customers. Both the identification of characteristics and the subsequent categorisation add to the UCC literature.

This thesis takes also the perspective of the UCC customers, namely receivers of goods (such as retail stores and offices) and municipalities. It is important to be clear about what taking customers' perspective means. Previous work in the area has noted that it is important to take the perspective of customers, but studies of UCC customers still tend to take the perspective of UCCs. Previous research has often investigated, for example, what UCC services are requested, without taking the customer situation into account. It is important to take the customers' perspective comprehensively, in order to fully understand

6 Conclusions and Contributions

customer needs. The work presented in this thesis has achieved this, by investigating the needs of putative UCC customers in systems without a UCC and of real UCC customers in systems with a UCC. Combining the analysis from different systems has led to a more multifaceted view. The work has shown, for example, that it may be beneficial for UCCs to give high priority to meeting customer needs that stems from problems. This result might have been missed if the studies had taken what a UCC can provide as their point of departure. Furthermore, the results highlight customer needs of municipalities and establish the importance of starting to consider them as paying customers, and not only as a party that subsidises UCCs.

Regarding the benefits that UCCs can provide, the work presented in this thesis are much in line with previous results, but also adds new identified benefits that UCCs can provide. The benefits identified include that receivers have a *specific contact person*, and that *municipalities use delivery information during negotiations with LSPs about the cost for transports*. The identification of benefits that UCCs can provide results in a more comprehensive list, and it can be a basis to clarify what UCCs can offer to customers.

This thesis also presents a deeper understanding of benefits by categorising them, and distinguish between tangible and intangible benefits. Understanding and highlighting the different characteristics of benefits can make it easier to make receivers more aware of them. Tangible benefits can be used if concrete examples are needed, while intangible can be used if the receivers are already aware of the more basic benefits. For example, potential cost savings are a tangible benefit, while an improved working environment with reduced stress is an example of an intangible benefit. Furthermore, one important finding is that it is not possible to conclude that only tangible benefits should be communicated since they are easy to understand. The results suggest that it is necessary for UCCs to understand the goals of the customer to be fully aware of which benefits should be highlighted. This thesis also describes societal benefits that are more relevant for municipalities. It is important to differentiate between the benefits, since different benefits are more relevant for different customers. The results in this thesis have been collected from UCC customers in both public and private sectors, which makes this possible.

This thesis also describes ways in which customer benefits can be increased. Increasing these benefits can increase the probability that customers will be satisfied, which can make them more willing to pay for UCCs and raise their acceptance of them. Hence, these results can be an important stepping stone for achieving more viable UCCs. The proposed ways have been clustered into a number of improvement areas, namely:

- **Understanding.** This area includes the understanding by both UCCs and UCC customers of each other's operations.
- **Communication.** This area includes decisions about how and what UCCs should to communicate to customers.
- **Holistic view.** This area includes procedures to avoid sub-optimisations for UCC customers.
- **Developing new services.** This area includes the development by UCCs of new services to match the needs of customers.

Several aspects have been identified within the different improvement areas that can increase benefits for customers. These may be directed to only UCCs, only UCC customers, or both. One example is that UCCs should satisfy needs that stem from some type of problem at the customers. It is also important to identify which benefits should be communicated to the customers, i.e. understand the situation of the customers, and the benefits they would appreciate. Another way, in which benefits can be increased, is through an increase in the expertise receivers possess related to the UCC operation. This expertise can enable customers to identify needs at their own operation. This can also increase their understanding of what UCCs can offer to them, and make them aware of the limitations to what UCCs can offer. This awareness can ultimately lead to improvements for receivers. Another important result is that receivers should avoid focussing on specific activities and cost, and instead apply a more holistic view of UCCs and what they can offer.

The improvement areas described above can also be related to the segmentation of customers based on customer needs. This thesis illustrates different types of customers groups with different types of needs, and relates these groups to the customer benefits experienced. Two groups have been identified: one with a narrow view of their needs, and another with a more open view. The results indicate that more concrete benefits should be communicated to the first group, in order to show clearly how UCCs can provide benefits for them. Customers in the second group were, in general, more aware of the basic and concrete benefits. Thus, an awareness of the type of customer group can allow a UCC to identify the types of benefits that are important to communicate.

With the purpose of this thesis in mind, understanding customer needs and customer benefits on a deeper level can prove useful for UCC operators. Such an understanding can contribute to suggestions about what is important for UCCs to target, and this may lead to more satisfied customers and ultimately to more viable UCCs. To conclude, the ways to increase benefits that have been suggested can be used as a support in achieving viable UCCs, and adapting these ways may increase the customer acceptance of UCCs. Achieving viable UCCs is an important step to improve logistics in urban areas with a safer work environment, and more efficient and more attractive urban areas.

6.2 Implications

6.2.1 Implications for research

The work presented in this thesis contributes to research in several ways. The identification and specification of both customer needs and benefits that UCCs can provide are important contributions to UCC research, and complement studies from, for example, Aastrup *et al.* (2012) and Gammelgaard *et al.* (2016). The focus has not only been on *identifying* need and benefits, instead this thesis presents also a deeper *understanding* of them. It highlights the characteristics of the needs and benefits, based on the frameworks used. The results in this thesis also adds to research beyond UCCs, i.e. other types of city logistics initiatives. An awareness of potential needs can simplify the introduction of other initiatives, and may increase the satisfaction of the customers. The process of understanding customer needs can also be applied to a wider area, one example of which is the field of environmental logistics. The stakeholders here are often the same, and similar obstacles exist.

The identification of ways to increase customer benefits also contributes to UCC research. This thesis provides important insights into how customer benefits can be increased, and these insights may help to find ways to support viable UCCs. These identified ways and the emphasis on understanding the needs of customers contribute also to city logistics literature in general, since the studied stakeholders are often the same. It may thus be important to identify ways to increase customer benefits in other city logistics initiatives (after the context has been adapted to the initiative). Furthermore, customer benefits are an important aspect of logistics in general, and the results that describe how to increase customer benefits may be applicable also in this field.

This thesis also contributes to research into UCCs by proposing how customers can be segmented based on their needs. It is often important to know who your customers are, and to know what they expect. Segmenting customers can be a way to better comprehend this. This is true also in the general field of city logistics literature, where similar aspects are important.

6.2.2 Managerial implications

UCCs are often viewed as an environmentally friendly initiative that can improve the urban environments, with a reduction in, for example, emissions, and lower energy consumption. The work presented here provides, to receivers, a description and a deeper understanding of the benefits that UCCs can offer. This can lead to receivers gaining a better understanding of how UCCs can improve their situation. In a similar vein, this thesis contributes with identifying and describing different types of customer needs that UCCs can meet. This can be used by receivers to further understand how UCCs can support them. Altogether, this can lead to increased benefits for receivers, which may result in receivers developing a more positive view of UCCs.

The work described in this thesis has identified and described ways to increase benefits for customers. This work can serve as a foundation for the stakeholders who operate UCCs. For example, it can simplify the introduction of UCCs, help to determine the customer needs on which it is important to focus, and suggest how to approach the customers. One important contribution to practice is determining that it is necessary to have logistics expertise at the UCC, since this facilitates many of the points above.

This thesis highlights the different roles that municipalities can take: receiving unit, as a financial contributor, or a passive receiver (through improved urban environment). The work leads to the conclusion that the role of a municipality should be as a paying UCC customer, since the potential societal benefits are usually worth paying for. The results also show that this way forward is sustainable. The municipality as an organisation, however, must understand its role and how it can contribute in a UCC system. This applies also to city logistics initiatives in general, where the roles of municipalities are often unclear. Furthermore, the positive implications of UCCs for the environment and society are highlighted (such as reducing the number of freight vehicles, a potential route for people to enter the labour market, and increasing the sense of security in the city, especially around schools).

Further managerial implications have been identified that are directed at other stakeholders than the ones in focus in this thesis. Suppliers and LSPs are two examples (see e.g. Browne *et al.*, 2005). The results presented in this thesis show that using UCCs can give suppliers and LSPs good publicity, which is a positive effect for them. By using UCCs, LSPs can also save much time since they do not need to enter congested cities, and can avoid queues at the receivers. However, UCCs can also limit the work of LSPs, through reduced transports in urban areas. The results also highlight another stakeholder group that can benefit, i.e. local companies that do not have a distribution system. One such example is local farmers. A UCC with a distribution system can include local farmers in their daily delivery routes. This is beneficial for the municipality, since the food quality can be improved. It is also beneficial for local companies, since their products can be distributed to a wider customer base.

6.3 Future research

With the conclusions of this thesis in mind, four areas are interesting for future research. First, to be able to make full assessments of UCCs, there is a need to also consider cost and sacrifices. Second, it may be important to examine the segmentation of customers and how it can affect the operation of UCCs. Third, the ways that have been identified by which customer benefits can be increased require further study. Lastly, it is of interest to extend the study beyond a Swedish context.

6.3.1 Assessment of UCCs

As noted at the beginning of this thesis, using UCCs may also bring some negative effects for its customers. Nevertheless, the work presented here has focussed on the positive outcomes, since these have not been studied extensively in previous work. However, cost and sacrifices must be considered before a full assessment of the consequences of using UCCs can be presented. The benefits must (usually) exceed the negative effects before private stakeholder are willing to pay for UCCs. Future research could therefore focus on making a more comprehensive evaluation of UCCs. One important step can be to determine how benefits and sacrifices can be balanced. This should cover not only monetary balance, but also other types of benefits and sacrifice, even if these are more complex and challenging to address. Furthermore, future research could focus on achieving a deeper understanding of cost and sacrifices, possibly by using frameworks similar to those used in this thesis.

Taking cost and sacrifices into account may also be important for municipalities, but the results presented in this thesis show that this is not always the case. It may be important to pay for services that could make the urban area more attractive and more efficient. However, an analysis that consider the costs and benefits can be important for all types of UCC customers, and future work could focus on different types of UCC customers.

6.3.2 Different customer groups

The analysis and discussion presented in this thesis led to two groups of customers being identified. The first group do not see many benefits from using UCCs, while the second group is more aware of the benefits and the potential of UCCs to provide additional services. The results also indicate that different approaches could be used to address these two groups. For example, the benefits that should be communicated differ between the groups, and it can be better to communicate more concrete benefits to the first group. This categorisation, however, is preliminary and future research could validate the groups or find alternative segmentations. Understanding different customers can be crucial to increasing the acceptance of UCCs, and may be an important step towards establishing viable UCCs. Another benefit of identifying different customer groups is that offers can be customized to better match needs. These two effects can lead to more satisfied customers, and could be studied further.

The customer segmentation used in this thesis was based on customer needs. Future research could examine whether other types of segmentation are relevant. For example, segmentation can be based on the type of receiver, or the types of UCC services in which the receivers are interested.

6.3.3 Increasing customer benefits

The identified ways to increase the benefits for customers presented in this thesis are a point of departure for future work. However, these ways could be further tested more extensively in real contexts and using other data. This can lead to confirmation or development of the identified ways. New ways of increasing benefits can also be identified. Since an increase in benefits is crucial to create viable UCCs, future research could study this area further. It may also be interesting to investigate whether the ways differ between public and private stakeholders. This thesis has combined the two, but future research could take this one step further and investigate if certain ways are more important for different types of stakeholders.

6.3.4 Beyond a Swedish context

Most of the data in this thesis have been collected in Swedish contexts. Data from other types of context could be collected in order to increase the validation of the results. By studying contexts other than the Swedish context, it may be possible to identify differences and similarities. Differences are interesting, since they highlight contexts in which UCCs are more or less likely to succeed. Similarities are also interesting, since it may be crucial to consider such aspects when implementing UCCs. Future research could thereby consider both.

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