

# Urban Consolidation Centers: The Voice of the Customer

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**Abstract** — An Urban Consolidation Center (UCC) is a logistics facility where loads are bundled across customers with the main objective to reduce urban freight traffic. Despite the potential environmental and traffic-related benefits, UCCs are not widespread in practice. As a basic requirement for successful operation in the long-term, the services of a UCC must be well-aligned with the needs of their customers. Therefore, this work listens to the voice of potential customers, by carrying out a survey among freight forwarders and carriers in the region of Lower Austria. A Value Proposition Canvas has been adopted as a framework for the survey to investigate the fit between customer needs and the value proposition of UCC services. The work aims to contribute to a better understanding of UCCs from a customer perspective.

**Keywords** — urban consolidation center, logistics service providers, survey, urban freight transport, city logistics

## I. INTRODUCTION

Cities around the world face the challenge of securing the supply of goods while managing the negative impact of urban freight transport. An Urban Consolidation Center (UCC) is a logistics concept that can contribute to a solution by reducing negative environmental and traffic effects of freight transportation in cities [8], [9].

A UCC is basically a logistics transshipment hub that is conveniently located on the edge of an urban area and is generally open for use by all logistics service providers. In such a hub, loads are bundled across customers and the UCC takes over distribution in the urban area [1], [2]. Unlike individual trips of carriers to their consignees with relatively low load factors, consolidated deliveries within the urban area help to optimize vehicle utilization and routing. The concept also supports the use of more environmentally friendly vehicles on the last mile. Overall, UCCs promise economic, traffic and environmental benefits [3]. In addition to transshipment and relatively short-term storage, additional services can be provided at the UCC to ensure profitable operation [4].

Despite the potential benefits, UCCs are not widely used in practice, and some UCCs have ceased operation when public funding was discontinued [6]. An example of a commercially successful UCC is Binnenstadservice in the Netherlands [7]. Theoretically, there are several possible ways to encourage the use of UCCs. First, UCCs can be supported with public funds to make them more competitive. Second, legal interventions, such as congestion charges or driving restrictions in cities, can divert freight flows to UCCs. Third, the services of a UCC must be well-aligned with the needs of their customers to increase competitiveness in the long term.

This work follows the customer-oriented approach and aims to listen to the voice of potential customers.

## II. APPROACH

An online survey among a UCC's potential customers, i.e., freight forwarders and carriers, has been carried out to investigate the fit between the UCC's services and the requirements of its market. The survey was aimed at companies in Lower Austria, a region located in the northeastern corner of Austria. The survey took place from November 2020 to February 2021 and resulted in 46 usable questionnaires.

As a framework for the survey, the Value Proposition Canvas, a tool for business modelling, was adopted [5]. A Value Proposition Canvas describes problems customers are experiencing ("pains") and how the offered products or services help to solve customer problems ("pain relievers"). A product or service will be successful when there is a good fit between the experienced pains and the offered pain relievers [5]. Moreover, a Value Proposition Canvas states the added value customers desire ("gains") and how added value is created for customers by the offered products or services ("gain creators"). There should be a good fit between the desired gains and the offered gain creators as well [5]. The questions of the survey are related to this concept to investigate the fit between the needs of UCCs' customers and the value proposition of UCCs' services.

## III. RESULTS

First, potential customers' general perceptions of UCCs are presented. Then the fit between the experienced pains and the offered pain relievers, i.e., how well a UCC can solve customers' actual problems, is examined. Finally, the fit between the desired gains and the offered gain creators, i.e., how capable a UCC is of creating added value that is actually desired by customers, is studied.

### A. General perception

In the following, three core questions are answered, namely, whether a UCC is generally considered a useful solution, which characteristics a UCC should feature and for which products a UCC is suitable as a transshipment point.

(1) 41% of the respondents completely agree that establishing a UCC in the southern environs of Vienna could be useful. The average level of agreement is 3.6 based on a 5-point Likert-scale, with 1 for "completely disagree" and 5 for "completely agree."

(2) The following characteristics of a UCC are considered particularly important in providing added value to logistics

service providers: good transport connections, neutrality and transparency toward customers, long opening hours and short waiting times for delivery and pickup, and competitive prices. (3) The following goods were mentioned for which a UCC would be particularly well-suited: automotive goods, building materials, clothing, electrical and kitchen appliances, food and beverages, household articles and goods for daily use, pharmaceutical goods, and regionally produced goods.

### B. Solving problems

In the following the question of how well a UCC is capable of solving customers' actual problems will be answered. Table 1 shows how strongly respondents agree that various problems are increasing for logistics service providers. It then links these experienced pains with offered pain relievers and indicates how strongly respondents agree that a UCC could be a good solution to the problem.

TABLE I. EXPERIENCED PAINS AND OFFERED PAIN RELIEVERS

The following problems are increasing for logistics service providers.	Level of agreement						A UCC could be a good solution to the problem for the following reasons.	Level of agreement					
	5	4	3	2	1	n/a		5	4	3	2	1	n/a
Disruptions in urban traffic	41%	28%	4%	9%	9%	9%	No problems with trips in the urban area	33%	22%	26%	4%	15%	0%
Problems with loading and unloading in the urban area	39%	37%	4%	4%	7%	9%							
Strict regulations for urban freight transport	39%	28%	13%	7%	4%	9%							
Dissatisfied customers due to irregular supply with relatively small quantities	24%	20%	15%	15%	15%	11%	Deliveries can be made to the UCC independently of the preferences and time constraints of the recipients	43%	13%	22%	11%	11%	0%
Customers require high reliability of delivery	24%	17%	28%	13%	7%	11%							
Customers require narrow delivery windows	43%	24%	7%	11%	4%	11%							
Great effort for route planning	26%	24%	15%	15%	9%	11%	Only one stop at the UCC instead of routes with multiple stops	43%	28%	9%	11%	9%	0%
Time-consuming loading activities	33%	30%	7%	15%	4%	11%							
High trucking costs	30%	24%	11%	11%	11%	13%							

For all questions, the level of agreement is determined on a 5-point Likert scale, with 1 for "completely disagree" and 5 for "completely agree." The following results have been obtained.

(1) Respondents clearly state that traffic-related problems are increasing, i.e., the average level of agreement reaches relatively high values. For disruptions in urban traffic, the value is 3.9; for problems with loading and unloading in the urban area, 4.1; and for strict regulations for urban freight transport, 4.0. This leads to the assumption that challenges with urban traffic may be a major driver for the use of UCCs. Therefore, the question arises whether a UCC is able to solve these problems. The UCC's location outside an urban area means its customers can avoid driving within the urban area. The respondents confirm, with an average level of agreement of 3.5, that a UCC could be a good solution, as it eliminates problems with trips in the urban area.

(2) Demanding customer requirements may be another major challenge of logistics service providers. The survey asks if respondents agree that problems related to customer requirements are increasing. The level of agreement is 3.2 for "dissatisfied customers due to irregular supply with relatively small quantities," 3.4 for "customers require high reliability of delivery," and 4.0 for "customers require narrow delivery windows." A UCC could offer a solution to these problems, as logistics service providers can deliver to the UCC independently of the recipients' preferences and time constraints. The respondents' average level of agreement that a UCC is a good solution to the problem for this reason is 3.7.

(3) Logistics service providers may face cost pressure due to operational challenges. Respondents agree, with the average values in brackets, that the effort for route planning (3.5), the time for loading activities (3.8), and trucking costs (3.6) are increasing problems. A UCC could be a solution to these

operational problems as, instead of routes with multiple stops, only one stop at the UCC would be required. The respondents' level of agreement that this could be a good solution is, on average, 3.9.

Based on these results, overall, a good fit between the requirements of the UCC's potential customers and the value proposition of the UCC can be assumed

### C. Creating added value

Crucial for the success of a UCC is not just its ability to solve customers' actual problems, but also to create added value that is in fact desired by its customers. Table 2 shows various opportunities that might become more important for logistics service providers and relates them to various ways for a UCC to create added value. In other words, Table 2 links the desired gains and offered gain creators.

TABLE II. DESIRED GAINS AND OFFERED GAIN CREATORS

The following opportunities are becoming more important for logistics service providers.	Level of agreement						A UCC can create added value in the following way.	Level of agreement					
	5	4	3	2	1	n/a		5	4	3	2	1	n/a
Improving the corporate image	39%	20%	22%	7%	7%	7%	Positive image through the use of an environmentally friendly UCC fleet on the last mile	26%	17%	22%	15%	17%	2%
							Positive image through a reduction of traffic and emissions due to consolidation effects	22%	15%	28%	20%	11%	4%
Improving market access	26%	20%	33%	2%	11%	9%	Reduction of market barriers due to the openness of the UCC for all logistics service providers	22%	15%	24%	20%	17%	2%
Expansion of the service portfolio to include logistics value-added services	30%	26%	26%	4%	4%	9%	Kitting as an additional service	22%	15%	20%	20%	22%	2%
							Packaging as an additional service	22%	13%	20%	17%	22%	7%
							Labeling as an additional service	20%	24%	20%	9%	26%	2%
							Quality control as an additional service	17%	9%	26%	20%	26%	2%
							Returns management as an additional service	41%	28%	15%	9%	7%	0%
							Waste management as an additional service	28%	28%	17%	11%	15%	0%
							Logistics consulting as an additional service	37%	17%	15%	11%	17%	2%
							Logistics trainings as an additional service	22%	17%	17%	17%	24%	2%

The level of agreement that the opportunities are becoming more important and that a UCC could create added value is measured on a 5-point Likert scale, with 1 indicating "completely disagree" and 5 "completely agree." The results are as follows.

(1) Respondents agree, with an average value of 3.8, that improving the corporate image is becoming more important for logistics service providers. A UCC can potentially help to improve this image through a UCC's positive effects on the environment and traffic, which might be attributed to the customers of the UCC. However, respondents agree less that a positive image could be created through the use of an environmentally friendly UCC fleet on the last mile (average level of agreement 3.2) or through a reduction of traffic and emissions due to consolidation effects (average value of agreement 3.2).

(2) The average level of agreement that improving market access is becoming more important for logistics service providers is 3.5. However, respondents agree with an average value of only 3.0 that a UCC can create added value through a reduction of market barriers due to the openness of the UCC for all logistics service providers.

(3) Respondents agree with an average value of 3.8 that an expansion of their service portfolio by including logistics value-added services is an opportunity with increasing importance. A UCC can carry out such additional services on behalf of logistics service providers, which can allow them to offer a broader service portfolio to their customers. The level of agreement that a UCC can create added value for logistic service providers by offering additional services varies by the type of service. The average level of agreement is especially high for returns management (3.9), waste management (3.4)

and logistics consulting (3.5), but lower for other types of services.

These results referring to creating added value suggest that the fit between the requirements of the UCC's potential customers and the value proposition of the UCC is just satisfactory.

#### IV. CONCLUSIONS

From a theoretical point of view, UCCs promise benefits for the environment, urban traffic and logistics operations [3], [8], [9]. These benefits basically derive from consolidation effects and the location of the UCC. By consolidating shipments across customers, vehicle loads can be increased, routes can be optimized, and economies of scale can be achieved. The typical location on the edge of an urban agglomeration and the associated relatively short distance for deliveries allow the use of vehicles that are well-suited to urban traffic and alternative drives, despite their relatively short technical range. Furthermore, possible different additional services by the UCC may contribute to the attractiveness of the concept.

Despite these advantages, UCCs are relatively rarely implemented in practice at present. The question arises why decision-makers often decide against this logistics concept. Decision-makers include particularly policy makers setting regulative conditions, as well as (potential) operators of UCCs and their (potential) customers. This work focuses on the potential customers of UCCs. By means of a survey, the perception of freight forwarders and carriers has been investigated. The results of the survey make it possible to draw the following conclusions.

(1) Overall, a good to satisfactory fit between the requirements of a UCC's potential customers and the value proposition of a UCC can be assumed. In particular, the fit between the experienced pains and the offered pain relievers is relatively high.

(2) Problems related to urban transportation are clearly perceived as increasing challenges and can serve as an anchor point for communicating the problem-solving potential of UCCs.

(3) Apart from competitive prices, good transport connections, neutrality and transparency toward customers, and customer-focused processes are seen as important features of UCCs. These features should be put at the center of the service design.

A comprehensive evaluation requires that not only advantages and opportunities, but also disadvantages and risks are taken into account. Potential disadvantages and risks can be considered in the dimensions time, costs, and quality. Regarding time, a delay in the transport chain due to an additional transshipment in the UCC is obvious. However, when transporting without the use of a UCC, logistics service providers may also have to consolidate loads to achieve economically reasonable utilization levels of vehicles. Associated delays can be reduced or avoided by using a UCC. The additional transshipment in the UCC generates costs, which will be charged to the customers through the chosen

pricing model. However, this can be offset by cost-reducing factors, including a UCC's ability to better optimize delivery routes due to a consolidation of loads.

In the quality dimension, it should be considered that part of the transport chain is no longer controlled by the customer of the UCC. This can create quality risks, but does not have to be a compelling disadvantage, as a UCC's relatively high transport volumes can also lead to quality-enhancing learning effects and professionalization in general.

Overall, it can be stated that disadvantages and risks are determined by a great variety of factors and are highly individual for each customer. It is assumed that considerations, as discussed above, are taken into account by the survey's respondents and implicitly reflected in the results. An explicit investigation of disadvantages and risks may help to gain deeper insights. However, this would ideally require examination of a UCC's specific business model which already exists or which is currently in its planning stage. This prerequisite was not met for the regional area under study.

The work contributes to a practice-oriented understanding of the benefits of UCCs for freight forwarders and carriers. The significance of the results is limited by the approach, sample size and regional focus. However, results may be used as a sound starting point for customer-focused design of the services of future-oriented UCCs. A next step could be to have a more in-depth discussion with current UCC users.

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