

The Possibilities of Using a UCC in the Czech Republic Cities and Important Criteria Evaluation

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Abstract

The current research of the transport situation in most European cities has shown unsustainability for the future. Due to the increasing number of residents in cities and increasing demand for e-commerce, increased the number of supply vehicles in cities, as well as pollution, congestions and car accidents. The most common solution for effective last mile delivery like vehicles using alternative fuels or electric vehicles for supplying the cities isn't enough anymore. There is a need to focus on the total number of vehicles in cities and on sufficient use of loading space of those vehicles. An urban consolidation center (UCC) could be a possible solution to economic, social and environmental problems in cities. This article focuses on possible using a UCC in the Czech Republic cities up to 100,000 residents. The article also provides an evaluation of the essential criteria for sustainability of UCC for the future.

KEYWORDS: *urban consolidation center, sustainability, city logistic, AHP*

1. Introduction

In recent years the environmental issues caused by urban freight transport started question future sustainability of many cities all over the world as well in the Czech Republic. The increasing number of vehicles in cities do not just affect the level of congestion and air pollution in cities, but also causes an increased risk of car accidents and affects the liveability in cities as it is. Very often the end-customers want their order to be delivered as soon as possible and force the transport companies to provide inefficient delivery, as a result, a lot of trucks circulating in cities with a low load factor. Transport companies are more concerned about their competitive advantage and prosperities then about future liveability in cities. That is why the city administration, such as cities municipalities or national government, need to come up with a way how to ensure the future liveability of cities. The first step should be realizing and expend knowledge about all the multiplies impacts that urban freight transport has in cities and their outcomes. Such as traffic congestions, air pollution and increases risk of car accidents as well as climate change and impacts on the health of residents. On the other hand, there are economic issues like higher logistics cost, the damaged economic competitiveness of urban areas, as a result of the uncontrollable traffic situation in that area. The second step that should be done is reducing the negative impact of logistics activities in cities. The second step will be more complicated, mostly because local authorities do not know how to minimize the negative impacts of logistics activities on the economy, environment and quality of life in the city. It is essential to use different measures of city logistics because sustainable development could be achieved just by creating a synergy effect of those.

2. Research methodology

The main focus of this article is UCCs. Their history started from the 1970s when the significant attention to the concept of UCC was being paid in the UK and France as well as in the US and Canada. The main ground for such attention were concerns about the environmental impacts of large, heavy goods vehicles in the urban areas and the low load factor of those vehicles [1]. Definition of UCC is not yet definite despite all the written publications about it. UCC can be characterized as a location close to the city or in it, where goods from outside the city are consolidated and delivered by a small vehicle [2]. On the other hand, an UCC is not just a transshipment center and it is necessary to consider all possible specifics. UCC is a logistics facility, which is situated in the proper distance from the area it will be supplying, with the primary aim to efficient the freight transport in the selected region. In connection with the use of UCC are reported following advantages for freight transport situation in the cities, transport companies, and residents. Environmental and social benefits, which seem to be the most important, could be achieved by more efficient logistics activities in cities. A higher level of planning and implementation of logistics operation could lead to new opportunities like more sophisticated information system [3]. According to some articles, a UCC could be a way to provide "just in time" delivery in

cities and by this switching the whole logistics system from “push” to “pull.” In the present time, a lot of companies arrange delivery using “just in time” system, but the efficiency of this system in terms of ecology is still being questioned. Whether we want this system in our cities is one of the many questions that need to be answered, before starting the whole UCC project. Providing costs and benefits analysis is also very important before UCC implementing. It is necessary to understand all the problems and disadvantages that could appear. The first issue during the construction and operation of UCC will be high investments along with the unwillingness of transport companies use UCC. A UCC means another “stop” in the supply chain, which would mean longer time needed for delivery.

Moreover, the UCC could have problems with the quick operation of such a wide range of goods. Other disadvantages of UCC could also appear later, for example, issues with effective organization inside the UCC [4].

The next part of the article would be paying attention to the existing UCCs in European cities, which could be similar to the UCCs in Czech Republic cities. Based on follow investigations will be identified the most important criteria for the sustainability of UCC in the future.

La Rochelle

A UCC in La Rochelle has situated about 1.5 km from the city center. It was aiming to promote delivery by using electric vehicles and reduce traffic congestions in a city center. The main feature of UCC, which also named Electric UCC, were electric vehicles that were adapted to the conditions of narrow city centers historic streets [5]. From the beginning, a UCC has used public funding from La Rochelle, but in the initial planning of the project was emphasized that UCC need to achieve its own financial viability [4]. A UCC had several stakeholders such as the city of La Rochelle, the number of commerce and industry and the French minister of transport. Regardless none the stakeholder presents the public sector, they evaluate the initiative very positive, according to the transport companies the platform was well-situated with satisfactory terminal staff. Transport companies saved about 3 hours a day on the car by using a UCC and eliminated the stress of their drivers, which did not have to drive through the city center. The only drawback as transport companies reported was a higher price for the service (3.75 euro/parcel) [5].

The using of UCC in La Rochelle is voluntary. On the other hand, the city administration supports it by providing the restriction for vehicles with a loading-capacities higher than 3.5 tons. They could enter the city but only in the time window from 6:00 am to 7:30 am [6]. The weak interest of retailers and transport companies to integrate into the system has become a crucial factor for future operations of UCC. An insufficient number of consignments jeopardize financial viability in the first phase of the project [7].

Leiden

A UCC in Leiden was open due to government initiative to improve urban freight delivery in the city. The basic requirements for UCC were financial viability, voluntary use and environmentally friendly vehicles [4]. After several years of unsuccessful operation, the UCC has been closed. The main reason for its failure seems to be the unwillingness of stakeholder to join the initiative, which led to an insufficient number of consignments and financial troubles. The estimated number of shipments needed for its successful operation was estimated at 1500 shipments per day. The minimum number of shipments to cover UCC operating costs was 600 shipments per day. In reality, a UCC had a problem reaching about 400 shipments per day [4]. The unwillingness of stakeholders to cooperate could have been a result of the inappropriate location of UCC, which was far away from the highway. Bad marketing communication leads to misunderstanding the purpose of UCC by stakeholders [8].

Bristol (Broadmead)

A UCC in Bristol has been established to provide supplies to the shopping area Broadmead. A UCC has located about 12 km from the serving area and close enough to the strategic road network. The use of UCC is voluntary, but a UCC is not financially viable and has a strong dependency on city councils' subsidies [4]. The first step in the creation of the UCC was a survey of retailers by face-to-face interview techniques. The survey aims to provide a list of customers, which would be willing to use UCC. The scheme utilizes new technology like electric, low-emission freight vehicle as a vital part of the project. As a result of using a UCC were reduced vehicle trips into Bristol center for retailers participating in the scheme for about 68%. A UCC offers to the customer a lot of value-added services, which have a very positive evaluation. The only problem is with financial viability because a UCC still needs more customers to cover the cost of operation [9].

3. Results of the research

A UCC seems to be a suitable solution for improving the current city logistics situation in the cities of the Czech Republic and for ensuring sustainable city logistics for the future generation. Some studies have shown the interest of Czech Republic cities municipalities in the city logistics issues. The city logistics measures could contribute to the improvement of the current situation and prevent the uncontrolled development of the city logistics situation in our cities in the future. According to the analysis below, UCC aims to improve the current traffic situation in cities, especially in connection with environmental and social policies and also with an accent on the quality of life in cities. Very often, the attention of the city municipalities was mainly focused on the main objectives of the UCC like location and type of vehicles that will be used to provide transportation. On the other hand, the main questions like who, how and for how long will ensure the financial side of the UCC project, stayed unanswered. In other cases, assumptions about future economic self-sufficiency of the UCC was way too unrealistic. That is why the main problem of existing and unsuccessful UCCs was the financial viability that directly affected the sustainability of the UCC. Based on the above analysis, it is clear that future funding of UCC is an underlying problem that needs to be solved before the UCC project starts. In most cases, the city municipalities are willing to cover UCCs costs for the start period. But even after several years of operation, some UCCs are still dependent on the city's subsidies, mainly because of the lack of shipments in the UCC.

The number of customers of UCC and a number of shipments going through a UCC seems to be a critical factor for its prosperity. Based on the above analysis, it can be argued that several factors directly affect the number of shipments, for example, whether UCC is mandatory to use or not. Mandatory use of UCC will require a change of legislative but ensure a high number of customers for UCC. On the other hand, the voluntary use of UCC seems to be an easier way, but there is still a problem with the number of customers. Most of UCC used a combination of voluntary use of UCC and restrictions on supply vehicles entering the city that are not from UCC. The popularity of UCC is also affected by the proper location of UCC. Drivers will not have to drive through cities and waste time in traffic jams. On the other hand, the inappropriate location of the UCC may be one of the reasons for its failure, as it was in the Leiden case. The quality of services and price for using a UCC are other vital factors that affect the popularity of UCC.

Despite the voluntary use of UCC in Bristol, more and more customers want to use it, mainly due to the high satisfaction of existing customers with the quality of services provided by UCC. It is important to note that the services offered by UCC should not be limited to so-called primary transport services. It is also very required for UCC to provide value-added services to the customers. The quality and extent of which is again crucial to ensure the prosperity of the UCC. According to the research mentioned above, marketing communication is a very critical factor, which affects the popularity of UCC among customers. The main effort of marketing communication should be focused on explaining the key reasons and valuable benefits of UCC utilization to the traffic situation in the city, quality of life in the city and the residents of the city.

The success of the UCC and the important criteria for its future prosperity may vary from the point of view of different stakeholders. In general, UCC, as any other project, can be evaluated from the perspective of internal and external stakeholders. Internal stakeholders are organizations that invest in the project or operate the project. Another group of stakeholders is external stakeholders, which could be transport companies, receivers or end-customers. Internal stakeholders in the case of UCC project are cities municipalities and government institutions, as well as certain private organizations that could be involved in the financing of UCCs or could be participating in the operation of UCC. From their point of view, the important criteria of UCC success can be followed.

Important criteria for the successful operation of UCC (internal stakeholders)

<i>Financial Viability</i>	<i>Meet the Objectives of UCC</i>
<ul style="list-style-type: none"> • Number of consignments • Price for using UCC • Operational costs • The range of value-added services • Price of value-added services 	<ul style="list-style-type: none"> • The better traffic situation in the city • Less pollution, noise, and vibration • Faster driving through the city • Better quality of life in the city

Table 1. Important criteria for the successful operation of UCC (internal stakeholders) (author)

As it is clear from the previous table, for internal stakeholders, the key indicators of UCC success are the financial viability of UCC and accomplishing the set objectives.

On the other hand, the key criteria which determine the success of the UCC may be different for an external group of stakeholders which are transport companies, receivers and final customers in the case of B2C business.

Important criteria for the successful operation of UCC (external stakeholders)

- Type of UCC (mandatory, voluntary, voluntary with restrictions)
- Price for using UCC
- Value-added services
- Quality of services
- Marketing communication
- Location

Table 2. Important criteria for the successful operation of UCC (external stakeholders) (author)

As can be seen from the previous table, the criteria for successful UCC projects could be different from the point of view of external stakeholders. The conflict of the interests between internal and external stakeholders may be a major problem in the process of creation and operation UCC.

To find out which criteria will be the most critical for implementing a UCC in the Czech Republic cities, we have applied an **AHP method** based on several discussion with experts in the field. To avoid duplication in the criteria, the financial viability and the type of UCC were eliminated from the AHP method. The results of the AHP method are shown below.

Pairwise comparison

Criteria	Price	Quality of services	Collaboration	Location	Marketing communication
Price	1,00	2,00	3,00	2,00	5,00
Quality of services	0,50	1,00	3,00	2,00	3,00
Collaboration	0,33	0,33	1,00	2,00	5,00
Location	0,50	0,50	0,50	1,00	3,00
Marketing communication	0,20	0,33	0,20	0,33	1,00

Standardized matrix

Criteria	Price	Quality of services	Collaboration	Location	Marketing communication
Price	0,39	0,48	0,39	0,27	0,29
Quality of services	0,20	0,24	0,39	0,27	0,18
Collaboration	0,13	0,08	0,13	0,27	0,29
Location	0,20	0,12	0,06	0,14	0,18
Marketing communication	0,08	0,08	0,03	0,05	0,06

AHP method results

Category	Priority	Rank
Price	37%	1
Quality of services	26%	2
Collaboration	18%	3
Location	14%	4
Marketing communication	6%	5

The AHP method examining the most important criteria of the UCC's success in relation to the Czech Republic's conditions has shown interesting results. The price for using UCC has become the most important criteria. Nowadays, when the price for goods transport is higher in the Czech Republic compared to other EU states. It can be assumed that a significant increase in the price will be a crucial factor for external stakeholder. Quality of services provided by UCC is also a fundamental criterion. The high level of competition in the transport services market forces providers to focus on quality more than ever before. In the case of using UCC for last mile delivery, direct contact with the customer would be lost and thus control on the quality. That is why the security of transport companies about the quality of services provided by UCC is essential.

It is very important to provide good services to the final customers. Otherwise, the external stakeholders will not be using a UCC or will be searching for a way how to leave out a UCC of the supply chain. Collaboration with stakeholders is also related to the future viability of UCC. Stakeholders need to realize all of the reasons for supplying the cities thought UCC, so they will not become in a way and will be cooperative. It could be the most significant barrier for the Czech Republic cities to provide a functional and self-sufficient UCC.

The right location as one of the success factors of UCC implementing was mentioned in every publication. A UCC should be located near the city it will be serving. So, there would be a possibility of using small cars for delivery to the city or some alternative ways, for example, cargo bikes. On the other hand, it is necessary for UCC to be as close to motorway or railways as possible, so transport companies, which need to drop off the shipments in UCC, do not affect transportation in the city with heavy vehicles.

The criterium „number of shipments" was intentionally eliminated from the AHP method. In the Czech cities' conditions with no existing UCC yet and with high competition in the area of transport services, providing last mile delivery thought UCC would be a significant change. It can be assumed that a lot of external stakeholders will see a UCC as an unwanted competition barrier. Therefore, a possible UCC project should be based on mandatory or voluntary with restrictions concept. In other words, most shipments will be forced to go through the UCC.

For this reason, the number of consignments needs to be calculated as a first thing in the pre-project phase of UCC. Based on how many shipments will be delivered within the city each day, the city municipalities should decide whether it is worth building the UCC or not. That is why the criterium "number of shipments" is not a variable, but it is a major input condition that needs to be considered before the UCC project is implemented.

Conclusion

Several UCCs in Europe have been analyzed to determine the most important criteria for the successful operation of UCC in Czech cities. Research has been focused on cities up to 100 thousand residents, the cities with similar UCCs have been chosen to be analyzed. To better understand the critical criteria of UCC implementing have been selected two successful UCC, one in France, La Rochelle and one in the UK, Bristol and one failed attempt of UCC implementation in the Netherlands, Leiden. Based on literature reviews [3], [5], [6], [7] have been selected five criteria which seem to be the most critical for the successful UCC operation in every city. The results of AHP method showed that the most critical criteria are the price of services, which transport companies or final customers need to pay for an item delivered through the UCC. It could lead from the economic situation and the fact that most customers think that delivery costs are quite high at the time. So, in the future, any increases in price will be seen as a negative and unwanted change. The quality of services provided by UCC and collaboration of internal and external stakeholders are the following critical criteria for the future success of UCC. Location of UCC which could affect the future price and availability of UCC for the transport companies is as much important as a collaboration between stakeholders.

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