

THE NEW APPROACH FOR THE POSTAL SERVICES USING CITY LOGISTICS METHODS

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Abstract: This paper focuses on the vehicle routing problems found in cities for goods distribution generally called as City Logistics which is a very discussed topic in recent years. Appropriate selection of the city logistics methods can help to remove the urban transport problems from the city with the constraints of space and with the need to clean the already damaged environment. That is currently, according to the research, one of the biggest problems for the big as well as for the small cities. The main aim for the area of City Logistics is to minimize the frequency of journeys of the supply vehicles in the cities, especially in the cities centers and by this minimization bring the environmental impact due to the added value of the service itself. Purpose of this paper is to explore the new city logistics problems and solutions and present some selected possibilities where the City Logistics services can be transferred to the postal services in the Czech Republic. One of the selected solutions is a consolidation of consignments at the spot of transshipment and then subsequently delivery of that consignment using a new approach. The paper itself can be divided into the three main parts. The first part focuses on the domestic as well as international research with an aim to bring a comprehensive overview of the City Logistics services. In the second part of this paper is an analysis of the current state of the City Logistics in the connection with the postal services. The new approach designed by the authors of this paper is in the third part.

Keywords: city logistics; postal services; consolidation of consignments.

1. Introduction

Currently, the ever-growing urbanization trend of large, medium and small sized towns is the object of interest not only for city logistics experts, but also for politicians and the public. The main reason for such attention is the negative economic, environmental and social impact of urbanization. Negative impacts include high congestion, noise, polluted air, vibrations and higher logistics costs in the city. While higher logistics costs are reflected in higher product prices, external effects in the form of polluted air and noise can cause various civilization diseases and generally a lower quality of life in the city. Tadić et. al. (2015) underlines that local authorities are aware of the importance of organization and control the current logistics chain situation in the cities, but most of the local authorities do not know how to minimize the negative impact of logistics activities on the economy, environment and quality of life in the city. According to the United Nations research, more than 54 percent of the population currently live in urban agglomerations. The prediction of the United Nations, according to which 66 percent of the population will live in cities by 2050, is alarming and there is a need to look for ways to ensure sustainable urban development. Tadić et. al. (2015) pointed out that besides the growth of the urban population, the trend of growing goods flows is continuing, which leads to increased activities of road freight and light commercial vehicles. Quak (2008) detailedly described the negative impacts of growing trend of road transport, which are related to the economy (increases prices), society (damages to human health, accidents, noise and lower quality of life in the city) and environment (emissions and consumption of non-renewable energy). Witkowski (2014) characterized city logistics as a process of planning, implementation and monitoring effectiveness of people, freight transport and information flows in urban areas in order to improve the quality of life in the city. Tadić et. al. (2015) pointed out the role of transportation in city logistics, which consist in a reduction of the number of empty vehicle-kilometers and control the number, size and characteristics of the freight vehicles. All of it is to achieve a city logistics goal, which is to increase efficiency and minimize the negative impacts of the logistics process and support the sustainable development of urban areas. All the authors outlined sustainability as a way to ensure economic, ecologic and social prosperity. Taniguchi et. al. (2013) outlined a need to create a balance between smart economic growth, transportation and cleaner, safer, quieter agglomerations and a risk of disaster due to global climate change. According to Brundtland (1987) sustainability can be characterized as a development that provides the needs of presents and do not compromise the ability of future generations to ensure their own needs. Russo (2010) described a worldwide Sustainable Development Strategy which aims to create a continuous long-term improvement in the quality of life by managing and using resources efficiently, developing economic and social sustainability in terms of efficiency and safety and environmental sustainability in terms of air pollution.

2. What Have We Learn About City Logistic so Far?

Nowadays attention is being paid to issues of sustainability all over the world, in some cities they have begun developing smart cities projects or at least their concepts for future realization. An inseparable part of the smart cities projects is city logistics, which is responsible for the logistics processes and the sustainable transport in the city. According to Taniguchi et.al. (2001) city logistics is “*the process for totally optimizing the logistics and transport activities by private companies with support of advanced information systems in urban areas considering the traffic environment, the traffic congestion, the traffic safety and the energy savings within the framework of market economy*”. Kauf (2016) defined that a main city logistics task is to improve the quality of life in cities for their residents and ensure

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competitiveness of businesses located in the city. Russo (2010) outlined the importance of consideration of different interests before implementing city logistics measures, means an investigation of the relations and the interests of urban transport stakeholders. It follows from the above that it is necessary to perceive the concept of city logistics comprehensively and take into consideration the needs and objectives of all stakeholders. Pursuant to Taniguchi and Thompson (2014) the four main stakeholders are: shippers, freight carriers, administrators and residents.

Residents are the most numerous group of stakeholders, they are the one who create the commodity and the transportation flows in the first place. The more residents that live in the city, the bigger the demand in restaurants and the shops, which lead to increased transport flows. Another reason of increased transportation in the city is growing e-commerce, due to the fact that residents more often buy things on the Internet and require delivery as soon as possible. That leads to an increasing number of freight vehicles in the city and lower loading factor. According to Demkes et. al. (1999) logistics providers trying to satisfy customer needs are more often focused on the effective time management instead of focusing on effective transport methods, which implies an increase of running vehicles and thus the vehicles-kilometers.

Logistics providers or freight carriers represent another major stakeholder, which can influence the logistics situation in a city. Freight carriers are the ones who decide which type of freight vehicle is used for transportation, the one who arranges the routing for vehicles and the one who is responsible for the loading factor. The main problem is the different goals of city logistics and freight carriers. While city logistics is focusing on sustainability in terms of ecology and society, the freight carriers focus on their incomings. According to Tadić et.al. (2015) as a result of such discrepancy, freight carriers provide their services without needed coordination, in most cities urban freight transport is very inefficient, which means that the same amount of goods can be delivered with a smaller number of vehicles-kilometers, but with the same or even better quality of service. The studies show that logistics services providers are mostly small companies, which have a lower utilization factor of the vehicles cargo space.

Another group of stakeholders, which is according to Witkowski (2014) plays the most important role in the city logistics system is the administration or government. The main goal for the administration should be a sustainable development in the city and ensuring high living standards in social, economic and environmental issues. Autor Witkowski (2014) outlined the most important tasks for administration related to each issue. In social areas it is ensuring the safety of residents and education of residents about the protection of the environment. In the case of economics, the main goal is to reduce the costs associated with the movement of people and cargo and in case of the environment the main aim is to reduce emissions of CO₂ and NO_x and noise reduction in the city. Tadić (2015) pointed out that the local authorities or administrations in European cities provide a lot of regulations and measures in order to increase consolidation, cooperation and coordination and thus raise the efficiency of the city's logistics. On the other hand, author outlined often inadequate decisions of authorities, which are made without the analysis of the existing situation, its surroundings and the impacts on the overall city's logistics system. Several authors (Allen et.al, 2000; Quak, 2008) agreed that often prohibitive and restrictive measures like restrictive measures concerning the load capacities of vehicles or time for accessing the selected zone in the city, has a negative impact on logistics activities, instead of making them more effective. Tadić (2015) underlined that restrictions and prohibitions in a city's logistics cannot be the solution itself, this requires a certain level of understanding of all stakeholders' activities and decision-making processes while considering the consequences for the entire system of city logistics.

The last group of stakeholders in a city's logistics system is the shippers, which represents different shops and restaurants as well as e-commerce retail. Shippers, in order to ensure high quality service for their customer and incomes for themselves, require the goods to be delivered on time. Often, they force the freight carriers to be punctual and implement a delay penalty, it leads to a non-efficient way of transportation.

Analysis of current city logistics situations and administrator initiatives shows that interaction between the private (freight carriers) and public (administrations) sector is deficient, which leads to a lot of misunderstanding and failures of city logistics measures. The main problem is that administrations do not know enough about the problems related to logistic activities in the city and the freight carriers are unable to formulate requirements from the administrations in order to achieve a sustainable city logistics solution (Tadić, 2015). Dablanc (2007) characterized the whole situation as a slowly changing process, where neither the freight carriers nor administration are willing to make progress, on the one hand the freight carriers are waiting for a right and supportive (financially) initiative from the government and the government, on the other hand, expected freight carriers to set up new logistics solutions, which will satisfy customers and environmental needs, but may not be profitable at all.

The main aim of city logistic is to find a new sustainable solution for transportation and supplying into cities which will be acceptable for all stakeholders. The key to success is based on cooperation and synergy effects generated by participants in the supply chain (Kauf, 2016). During the history of city logistics there has been presented a lot of city logistics methods and assumptions, focused on creating a sustainable city. For example, there are studies about urban logistic terminals, last mile management, different types of consolidation and a reduction in the number of trucks trips in the city. According to Taniguchi (2014) some of the elements are fundamental for creating a sustainable city logistics system. For example, innovative technology for information and communication, Intelligent Transport Systems, cooperation between the public and private sectors and changing the mind-set of logistics managers are some of them. Using information and communication technology (ICT) and intelligent transport systems (ITS) could help the shippers qualify their services by tracking vehicles with GPS, tracking freight containers or palettes, route planning to avoid congested roads based on digital maps and real time traffic information. ITS could also help to reduce operation costs, by reducing the number of trips (Nemoto et. al. 2001).

According to Gonzalez-Feliu et. al. (2013) the most difficult element is cooperation between the public and private sector. The main problem of public-private partnership is the conflict of interests where, on the one hand, is the private sector (shippers, freight carriers, shoppers), who wants to constantly improve the service for their customers, notably by more frequent and smaller supplies of goods. On the other hand, is the side of the administration, who want to coordinate the private sector activities to minimize the environmental and social impact of transport and create sustainable, liveable cities for their residents. The last fundamental element in creating a good city logistic system is, according to Taniguchi (2014), a change in the mind-set of logistic managers, mostly because logistics managers are the main players in urban freight transport systems. They are the one who makes the decisions about whether their company is going to provide a green city solution and educate their employees about sustainable cities and how they can participate or not. The main thought is that we cannot solve 21-century problems with 19th-centure mindsets (Landry, 2012). But are the logistics managers the only ones, whose mind-set needs to be changed in order to create sustainable and livable cities?

2.1. City Logistics Current Situation and the Theoretical Measures

There are different types of city logistics management, which are focused on different management methods and city logistics schemes to arrange environmental, economic and social sustainability in cities all over the world. The key success factor in achieving city logistics goals in every city is a right combination of different city logistics schemes and management methods in order to create a synergy effect.

The first step in applying the best fitting logistics measures in a selected city is finding the current transport situation and the major relating problems in the city. Tadić et. al. (2015) outlined a problem with empty runs of vehicles in the cities due to geographical imbalance, unsuitability of the vehicles and problems with routing and scheduling the vehicles. Geographical imbalance exists due to current logistics organization, when most cities are supplying from logistics centers outside the cities, which increases the transport distance during the supplying and costs reverse empty runs of vehicles. According to Allen et.al. (2012) there are several factors that affect the extent and location of logistics activities for example population density, size and economic structure of the city, operational models and vehicle structures in the realization of flows. Significant impact on urban areas has supply chain organization, means locations of logistics centers, warehouse systems and spatial arrangements within the chain. Dablanc (2007) pointed out the problem with the regulation of city logistics situations, which is the same as 20 years ago, for example identifying the maximum size or weight of trucks authorized to deliver in city centers. Author Dablanc (2007) described a new model of restrictions used in some European cities, which focuses on Euro emission standards of vehicles and the loading factor. According to these restrictions just the latest vehicles and fully loaded trucks can enter the city center. Dablanc (2007) also characterized a problem with the age of vehicles, turns out supplying vehicles tend to be older than the rest of the fleet of the truck industry, which leads to higher environmental pollution in the city.

The second step, after defining the common city logistics problems, which seems to be the same in all cities in Europe and the world, is finding an appropriate city logistics solution. As it was pointed out before, there are a lot of city logistics methods focusing on different types of city logistics problems. Some of the city logistics methods were already applied in the cities and some of them are in the planning phase, it depends on the degree of difficulty and input needed to process the different methods. Less input needed methods like access control to cities are currently more common in cities than for example one of the most expensive measures like an urban consolidation center. On the other hand, the problem with urban consolidation centers (UCC) is very often mentioned in the thematic literature, several publications are focused just on this problem. According to Brawne et.al. (2005) UCCs can be defined as a logistics facility situated in the city center or close to the area, which is supplying from the selected UCC. The key requirements are to avoid the part load deliveries into urban centers and provide facilities like UCC to insure consolidated deliveries by appropriate vehicles (for example smaller vehicles using alternative fuels or bicycles) with a required level of load factor. Due to the requirements below using an urban consolidation center brings a lot of positive effects to the city, for example less pollution, noise and congestion. Moreover, UCC has a positive impact not just on city logistics, but also offering a possibility of value-added services for its users as well, the only question is if they are open for reconfiguring logistics activities or not. According to Gammelgaard et. al. (2016) the benefit for users of UCC has two parts, one is consolidation of different deliveries at the UCC, so the user only receives one delivery per day and the other one is the program of value added services, the range of which can be different due to requirements of users. Gammelgaard et. al. (2016) describes possible additional services as stockholding, pre-tail activities, order process, return logistics, home delivery or last mile solution. Stockholding is a commonly used additional service for UCC costumers, when shipments are not just consolidated and transported to the customer, but also stored for some period. It helps users (for example retailers) improve space usage in the store and use of employees. Pre-tail activities often represent control of goods and making goods ready for shelves, for example price tagging. Home deliveries often connected with e-commerce, when UCC can arrange deliveries of goods straight to the final customer. UCC can also provide added service at the delivering place as unloading at the right place, unpacking or even putting goods on shelves in the store, so store personal can take care of the customer at the same time (BESTUFS, 2007). All these value-added services aim-to persuade stores or restaurants in the city to use UCC for their deliveries in order to achieve sustainable transportation in the city. Another value-added service which UCC can provide is reverse logistics. Efficient reverse logistics is very important in the aim to achieve city logistics goals. Nowadays reverse flows of packaged material or returned goods is a noticeable problem for efficient city logistics in cities. According to the Reverse Logistics Executive Council reverse

logistics is a specialized segment of moving goods, which starts after the sale and after delivery to the customer. Anthony (2005) characterized reverse logistics as the process of returning finished products for replacement, repair, or credit. Reverse logistic according to the author is often very costly for retail or logistics providers, but at the same time represents a necessary part of maintaining an efficient supply chain. Efficient reverse logistics plays an important role not just in the cost structure of it provider, but also in efficiency of whole city logistics organization. Reverse flows of returned goods from customer are difficult to organize and often causes additional runs of vehicles with very low load factor. That leads to additional environmental pollution, noise and congestion in the city. As it was pointed out before, there are a lot of city logistics methods focusing on different types of city logistics problems, Taniguchi et. al. (2014) prepared a summary of city logistics management methods (Table 1).

Table 1
City Logistics management types

Management Methods	City Logistics Scheme
Traffic flow management	Constructing ring road, truck route, access control to cities, low emission zones, providing traffic information using ITS
Parking management	Truck only parking space, loading/unloading space on streets
Time management	Off-hour delivery, time windows for entering cities, time sharing between trucks and cars
Vehicle management	Low emission vehicles, optimization of vehicles routing and scheduling, road pricing, load factor control
Cooperative freight transport	Urban consolidation centers
Co-modal freight transport	Using passengers' cars or trams for delivery
Recognition	Recognition of green freight transport companies
Organization	Freight quality partnerships

Source: Taniguchi et. al. (2014)

2.2. City Logistics Measures through the Practical Knowledge

City logistics measures and systems are different for big, medium and small size cities, but it turns out that sharing information about experience with city logistics projects within the cities is a key to success. All over the world there are similar cities, which could share their ideas and help each other to receive the sustainability and liveability. It is crucial for international knowledge of city logistics, to know mistakes that were made and learn and get inspiration from them. In 2002 the European Commission created a co-funding CIVITAS Initiative ('City-Vitality-Sustainability') for cities to network together and try to minimize the burden caused by urban freight transport and to create a cleaner and better place to live. Within the CIVITAS Initiative program, city-laboratories have been set up, where the various measures of sustainable transport have been deployed, tested and evaluated. The various number of measures were focused on different city logistics system like: alternative car use, clean fuels and vehicles, cycling and walking, logistics and goods distribution, mobility management, traffic management, public transport and access and parking management (civitas.eu., 2013). The CIVITAS initiative project has 5 phases, each phase included different cities and different implemented measures. Nowadays, the fifth phase named CIVITAS 2020 has continued, in which there are involved 17 cities and 3 living lab projects. Almost 70 cities participated of the CIVITAS initiative project during the first four phases. According to Rooijen (2014) and CIVITAS Elan final Evaluation report (2012) a lot of different measures were used in the EU cities, the most common were:

- an inner-city distribution center in order to create a new more efficient way of goods distribution,
- using an ITS to improve routes for good delivery by minimizing the number of routes or using real time communication to avoid congestion,
- using clean vehicles to minimize air pollution in the city.

Different cities involved in the CIVITAS project use different city logistics measures in order to adapt them in the most efficient way to the selected city. Next Table 2 represents success CIVITAS initiative project measures in cities across Europe (Rooijen, 2014).

Table 2
Successful CIVITAS projects

City	Measures and their implementation
Time windows in Iasi	Two times windows (one in the early morning and one in the afternoon) were implement in Iasi to optimize traffic flow in the city. Companies which use determinate time windows were awarded. The number of goods distribution vehicles decreased at peak hours leading to a better traffic throughput.
City distribution by Boat in Utrecht	In order to increase the use of water transport and to reduce the air emission, a zero-emissive electric boat was introduced to cover the supplies to a clients, shops, bar and

City	Measures and their implementation
	restaurant along the canal. The key result was the reducing of CO2 emissions by more than 38 tones.
Consolidation center and electric delivery vehicles in Bath	DHL company established consolidation center and use an electric vehicle for delivery into central Bath. New service was free for 15 months for business in Bath. Important result was decreasing number of trips to Bath and reducing CO2 and other pollutant emissions.
Low emission zone in Aalborg	The main idea was to create a low emission zones across the city to force distribution company to fleet renewal and use heavy duty vehicles complying with the latest standards.
Cargohopper in Utrecht	The electric Cargohopper is a multi-trailer 16 meter-long designed to fit into small street network of the city center. The multi-trailer has a capacity equivalent to 5 to 8 vans and delivers freight from a City Distribution Centre to the inner-city.

Source: (Rooijen, 2014)

During the CIVITAS initiative a lot of unsuccessful experiences were in the cities, but the important things are the suggestions and recommendations of how to avoid the same problems in futures projects. As it is turns out the most important conclusion from all projects across Europe is about the importance of partnerships between businesses, operators and authorities, which seems to be the key factor for the successful implementation of any measures (McDonald, et al. 2010). That's why the main innovation, which was outlined in the CIVITAS Elan final Evaluation report (2012) is the integration of measures from different policy fields into one comprehensive urban policy concept, for example stakeholder integration, institutional integration, policy integration, spatial integration, modal integration, cross-site integration and technological integration. Rooijen et. al. (2014) outlined that a very common urban freight logistics measure an urban consolidation center was planned during the project CIVITAS in a lot of towns, but almost none of the projects were successful. According to McDonald et. al. (2017) the main reason of failure was the insufficient partnership between the stakeholders. Taniguchi (2014) describes successful urban consolidation centers in the towns of Japan. Consolidation centers in Japan work on joint delivery systems, which means cooperation of freight carriers to jointly deliver and/or collect goods to and from customers using urban consolidation centers. The key reasons to create an urban consolidation center are the same in European countries and in Japan, like reducing the negative impact on the environment, reducing cost, number of vehicles and number of drivers. Author pointed out the different success factors for urban consolidation centers in Japan and in European countries due to different mentalities and customer habits. While the success factor according to Taniguchi for Japan's cities are good leadership, enthusiasm towards achieving goals and a business model to maintain joint delivery systems, in European countries the success factors are mind-set of balancing the economic vitality and the environment, core organization for management of urban consolidation centers and neutral carriers for operating the delivery. Of course, some of the factors are the same. For example, appropriate location for the urban consolidation center and sufficient use of consolidation center.

The objective of the article was to find out, among other things, the existing state of the city logistics under the conditions of the Czech Republic and to describe the Czech scientific publications related to the problem. Research of literature shows a lack of publication about this topic in the Czech Republic. Research in the Visegrád Group states (Czech Republic, Slovakia, Hungary and Poland) showed a lack of publication on urban logistics not only in the Czech Republic, but also in Slovakia and Hungary. In comparison to that of Poland, the problem of city logistics is devoted to several authors (Witkowski, Kiba-Janiak). However, the lack of any publication does not mean the complete absence of a city logistics project in the Czech Republic, for example the second biggest city in Czech Republic Brno was participating in the CIVITAS initiative project. The main objective of Brno's participation in CIVITAS ELAN was to improve the quality of public transport and to lead more people to use the services. Since the beginning of the project, Brno has equipped all ticket vending machines with a system that automatically alerts the control center to any defects, so it can be quickly resolved. In response to the aging population, Brno has introduced new low-floor minibuses that also allows easier access for wheelchair users. Brno also wanted to modernize its fleet of public transport to make it less polluting and more energy efficient. For example, in trams and trolleybuses, they installed a heating control system to optimize energy consumption (civitas.eu., 2013). Prague the main city of Czech Republic also participated in a city logistics project across Europe named SUGAR. SUGAR (Sustainable Urban Goods Logistics Achieved by Regional and Local Policies) aims to address the main city logistic problems like ineffective management of urban freight distribution, as a critical component of the overall urban transport system and a primary source of vehicle pollutant emissions. The main goal of the project is promoting the exchange, discussion and transfer of policy experience, knowledge and good practices through policy and planning levers in the field of urban freight management. The city of Prague's participation was about creating protected delivery zones, which aims to protect the historical center and create better conditions for flowing traffic. The project was achieved due to regulations based on the weight limit of trucks allowed to circulate in the historic center of Prague and setting parameters for delivery time windows in the city center. According to SUGAR (2011) the project was successful, the volume of trucks declined by 85% on the busiest routes, and traffic was transferred to more appropriate roads.

Dablanc (2007) pointed out two different, somewhat unusual measures in London and Barcelona, which helped to improve the city logistics situation. The first was about successful partnership between the logistics providers and the administration, where the two biggest carriers' organizations discuss the practical details of delivery organization with

transport for London representatives on a regular basis. After a very conflicting discussion a compromise was achieved, for example, the level of the congestion pricing tax assigned to delivery trucks (£5 a day, the same as for car drivers). The second one described city logistics measures used in Barcelona, Spain, according to the author the administration of the city hire a freight motor squad to prevent illegal long-term parking. After this the leaner lines are being used for truck delivery, as zones for loading/unloading space during off peak hours and as parking in the night for residents.

3. Current State of the City Logistics in the Connection with the Postal Services

According to the European Commission, which is responsible for the efficient functioning and the legislature of postal services in Europe, postal services play a key role in an effective and dynamic market of businesses and EU citizens. The European Commission works on improving the quality of delivery and access to postal services. Official documents focused on postal services across Europe offers a lot of information about the significant role of postal services in the EU economy (the EU postal sector accounts for €91 billion or 0.72% of EU GDP), employment (about 1.2 million people were employed by universal postal service providers in 2013) and in e-commerce (the parcel sector is dynamically growing in terms of volume and plays an important role in the development of e-commerce). Over 6.4 billion items were shipped in 2011 (European Commission, 2011). But according to Dieke et al. (2013), between 2007 and 2011 the European letter post sector declined in terms of revenues and volume. Demand for traditional letter delivery has fallen significantly: since 2006, the aggregate mail volume declined by more than a quarter in advanced economies and more than halved for some posts. In recent years the decline in mail volume slowed to 4.2% in 2016 compared to 5.6% in 2015 (IPC, 2017). Another significant change in the postal services market is the large development of e-commerce, which has led to the changing of consumer behavior and growing demands for parcel delivery services. Worldwide people buy things online more than ever, Internet retail sales have risen 18% per year on average since 2006. In response, postal operators create clear and consistent strategies, looking to grow the parcels business and further enable e-commerce. Also posts operators are seeking growth in new business and geographical markets to diversify revenues and are focusing on cost control and innovation as competition heats up and customer needs evolve (IPC, 2017).

Furthermore, the postal services market has undergone another change, which was the full liberalization in 2012, after that changes in the national postal services providers have exposed the competitive pressure mainly on profitable markets such as the parcel delivery market. National postal operators in Europe reserved in the area of universal services for example letter mail and preserve the monopoly position in this market. However, it has become necessary to maintain a position in the growing parcel delivery market, where most of the competing companies apply the strategy of cream-skimming, i.e. offers its services only in the cities with the highest density and offers fast and frequent delivery through the distribution warehouses around the city. The situation has led to the fact that large number of trucks from different companies are daily circulating in Czech and European cities. The biggest issue is that the councils of the cities have no idea how many cars are going through the city every day and what impact it has on the environment and traffic situation in the cities. The situation can be symbolized with the scheme below:

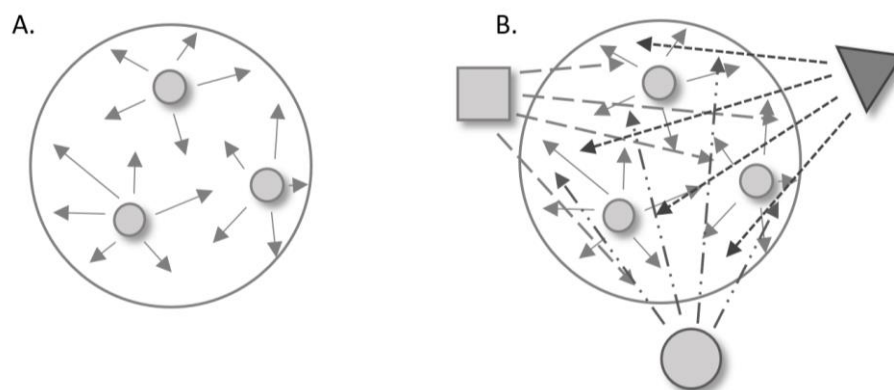


Fig. 2.
The supply chain situation in the city before then (A) and now (B)
 Source: Author

Figure 2, Part A, illustrates the supply chain situation in the city before the e-commerce growth and liberalization, which means before the strong competition in the selected market, during this situation the national postal service provided the letter and parcel deliveries within the city. Now the situation has changed quite a bit (part B), the supplying cities arrange different transport companies from the distribution centre outside the city (triangle, rectangle and wheel), it leads to a bigger number of trucks in the city and chaos in city logistics, when transport companies in effort to achieve the greatest gain and take on a high competitive position offer more frequent transport by low loaded factor trucks. The e-commerce growth and the liberalization of the postal market consignments has caused in the cities the appearance of large number of private companies offering preferential parcel delivery services, which had lead to the need for changes to the national postal services provider in order to succeed in the new competitive market. The

European Commission's efforts to increase the efficiency of the postal sector, by opening the market to competition, has been accomplished. There are a lot of successful and efficient transport companies offering supply chain in the city, however it looks like the side effect of liberalization and e-commerce growth was one big surprise for the cities and until now it is not clear how to solve this problem. The situation has persisted in many European cities since 2012 and it is one of the causes of such a wide interest in city logistics now. The main topic of this article is a suitable solution for the current situation particularly the inefficient position of national postal operators and unsustainable traffic in EU cities, especially in the Czech Republic. As was mentioned before, several authors dealing with the issue of city logistics perceive the lack of cooperation and communication between the private and public sector as the main cause of the failure of many projects in the field of city logistics. The scientific research and publications about this subject are focused on the possible ways how to ensure effective communication between two sides and force the private sector to respect the interests of single cities.

The main idea of the article lies in another view of the whole situation: why, in order to create sustainable city logistics in the cities, not directly cooperate with a more suitable partner? A partner who already has a network site, city-centre buildings, and transport facilities to meet the needs of customers primarily in the parcel delivery market (B2C or B2B) and will be willing to take into the consideration the requirements for sustainable urban development, particularly in the area of sustainable transport. It can be assumed, therefore, that a national postal operator, such as Czech Post, which is linked to the state (compensation for the provision of universal postal services) and for which, apart from private entities, constantly increasing profits at any price is not the main objective (due to historical development and the post-mortem position of the post office as a firm), could be more sophisticated and adapted to the underlying requirements on environmental, social and economic sustainability in cities.

Czech scientific journals do not offer a lot of papers dealing with the role of postal services in city logistics system, on the other side foreign transport journals provide several papers dealing with possible cooperation between the postal sector and the city logistics. According to the annual report (2017) Czech Post owns 3200 branch offices across the Czech Republic, has about 30 000 employees and transported about 341 848 packages in 2017, 20 % of all vehicles are vehicles using alternative fuels. Thanks to this Czech Post retained the position of leader in the package and postal services market. The below information shows that Czech Post has the resources to become a major logistics provider in cities in the Czech Republic. As was pointed out before the city logistics situation isn't sustainable for the future, the councils of most cities don't even know how many vans from different logistics providers are circulating in their cities every day and how big an impact there is on the environment. So, partnership of logistics providers and councils is essential as never before, the Czech Post is a perfect candidate, because due to historical development it is the biggest logistics provider with resources and border networks in each city within the Czech Republic. But there is still the question of how to make this partnership work and what change in legislation may be needed?

During the literature search, it was found that the topic of postal services and its use in the city logistics sector is not very much studied. There is a big lack in European literature on this subject, especially in view of the decreasing number of letter shipments and the need to find a new direction for the use of large postal sector resources. The problem with the use of the postal sector for the purposes of city logistics is quite a matter of concern in the United States, where several distinctions on this topic came directly from USPS.

According to USPS (2016, a) there are already some projects between USPS and the cities in order to achieve "smart" cooperation, which aims to decrease traffic congestion, cut pollution and improve infrastructure. In achieving these goals data and analytics play an important role, the postal service with its ubiquitous network and its huge infrastructure of vehicles, post offices and mailboxes could help the local councils in the collection of multiple types of data, that could be used towards better management of city logistics and help to solve age-old problems like traffic congestion, poor air quality, and infrastructure maintenance. Some example of using such data comes from Boston, where the sensors on postal vehicles can record data about the smoothness of the ride and the location of the problem area. The representatives of a city, which gets the data through cloud identify potholes, monitor urban road maintenance and plan long-term investments in infrastructure. Another good example of using the postal vehicles and its vast infrastructure that crisscrosses the country daily is attaching sensors of air quality to the postal vehicles and making them mobile. By that postal services contribute to the health of cities inhabitants, the data from the sensors are automatically sent to the cloud and help the government save money, provide better targeted climate action plans and improve public health. The use of postal services in order to achieve city logistics goals is possible not only in the use of vehicles of the postal sector but also, for example, in using its space in the city.

Another area of cooperation between postal services and city logistics can be storage, according to USPS (2016, b) the boom of e-commerce has changed the fundamental aspects of warehousing. Available storage areas are at the lowest level since 2001 due to the growing demand for e-commerce retailers. A lot of big warehouses are built near the cities or major transportation infrastructure with the aim of getting the quickest possible transportation to the customer. On the other hand, demand in retail is looking to get smaller warehouses in urban city centers and aims to compete with major players on the market like Amazon and provide very fast delivery. According to the authors (USPS, 2016, b) with a vast network and available places like this the national postal operator can satisfy this demand and rent the places to the retail sector. In the research about Czech Post and its resources, has been found out, that exactly this model is working for Czech Post, which is offering their unused spaces for rent via Internet. On the other hand available warehouses in the city center could contribute to the transportation process of logistics provider, for example optimize the delivery window and radius for e-commerce orders. Use of this space in cities could be focused on efficient last mile delivery, which is the slowest and the most expensive part of delivery routes. The right use of warehouses in the center could not

just contribute to the incomes and efficiency of logistics providers, but also on whole city logistics systems. Another use of national postal operators with a view of city logistics needs can be thought about reverse logistics. Contribution of national postal operators in organization of reverse flows in the city could be fundamental due to major network transportation within the city and available spaces in the city center, which could be also used for processing returns. According to the USPS (2016, b) the national postal operator in the US does not provide complete reverse logistics services. On the other hand, it does provide some returning for individual and business customers, for example Parcel Return Service (PRS), Merchandise Return Service (MRS), and Bulk Return Service (BPRS). While PRS provides an affordable returns solution for large volume shippers, including the first mile pick up, MRS enables merchants to provide customers with prepaid back-shipping labels that are only charged when parcels are scanned. And BPRS uses the advantage of postal services on small consignments to quickly return unified packages. USPS also decided to provide reverse logistics as a long-term goal.

4. Conclusion

The situation with traffic in European cities, especially in the Czech Republic, is alarming, efforts to achieve the sustainability by traditional methods of city logistics in most cities have failed or have not brought the desired effect. The major cause of failures seems to be the lack of communication, cooperation and, above all, the lack of understanding urban sustainability needs by private stakeholders. It looks like that, for the purpose of creating a functioning city logistics system in cities, there is a need to find a suitable partner, and to set more control of the traffic in the city. The system of control cannot represent just a list of restrictions, such as limiting the entrance of vehicles to city centers but should provide a way of creating a functioning city logistics system or smart city in the future. Currently, several publications describe the beneficial relationship between postal services and cities, where the postal sector thanks to the extensive infrastructure could help in achieving the goals of city logistics. This cooperation could be mainly used in the Czech Republic, where the postal sector's position is relatively strong. Another advantage of the use of the Czech Post for the needs of city logistics is the possibility of using the postal sites, which are already very extensive and includes attractive buildings in city centers throughout the whole area of Czech Republic. At present time, some of the Czech Post space isn't sufficiently utilized, many valuable spaces are available for rent on the Internet. At the same time, those spaces can represent a great competitive advantage or help in achieving the goals of city logistics, especially while e-commerce is developing and the efforts of transport companies to meet the demands of the customer are growing. One of the effective city logistics systems that are currently used abroad and can be used with the conditions of the Czech Republic is urban consolidation centers, which is used for supplying cities. The shipments from UCC are delivered by alternative vehicles or are provided by alternative delivery ways such as a bicycle, or night delivery. The UCC system eliminates a large amount of supplies from different companies in the city, when private logistics providers are allowed to arrange transportation only to UCC, not in cities. The biggest challenge in creating a UCC is the selection of a suitable place and partner to ensure UCC operation and delivery within the city. On the basis of the presented analysis, it can be assumed that Czech Post could be a suitable partner for the UCC operation. As was already mentioned, Czech Post is a state-owned company that could take into account the city's environmental needs, on the other hand as a possible UCC brownfields currently belonging to Czech Post could be used. The launch of such a project would represent a new direction for city logistics as well as for Czech Post. The main challenge at the present time is the analysis of a solid possible solution and the necessary legislation based on the selected city.

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