

LOGISTICS SPRAWL AND E-COMMERCE: IMPACT ON CITY LOGISTICS

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Abstract: *Some of the key fragments in development of modern cities are urbanization, new business models, and expanding the logistics center's network. In doing so there needs to be: growth of road transport and growth of requirements in terms of speed, flexibility, reliability, and diversity of logistics services. With a lack of planning activities and long-term plans for city logistics these trends are threatening sustainable development of urban zones. The space intended for logistics activities is declining in cities. Logistics companies are moving out of expensive urban zones and developing their systems around the perimeter of the city. Their goal is being to centralize supply chains. On the other hand, the upward trend in e-commerce changes the structure of supply chains and significantly increases the locations and amount of deliveries. The final goal of this project is to analyze the trail of logistics and growth of e-commerce. While also finding out what kind of impact they have on city logistics. Without adequate conceptual city logistics solutions, these trends pose a serious threat to the functionality of some cities.*

Keywords: *city logistics, e-commerce, logistics sprawl, urban freight transport*

1. INTRODUCTION

City logistics is a very important topic among urban planners in most developed cities and countries. Supplying the cities and returning materials from urban areas were complications present and addressed in accordance with different levels of economic, cultural, and technological aspects of social development. Delivery of goods is a prerequisite for the maintenance of urban life and commercial activities. It allows for the achievement of wealth and development of urban areas (Zečević & Tadić, 2006). However, logistics activities, primarily urban freight transport, are not desired in urban centers. Trucks are making a significant contribution to traffic congestion, negative environmental impacts (emissions, noise, vibration, etc.), and this reduce the quality of life in the city (Tadić & Zečević, 2016). The trend of urbanization and the rapid development of cities in recent years are exceedingly noticeable.

Economic expansion and the advancement of the city is the key motivating force, and simultaneously a "sacrifice" to the development of city logistics and urban freight transport (Tadić & Zečević, 2016). Cities depend on the efficiency of logistics and transport systems. Their further development and economic progression is closely associated with the continued expansion of logistics activities, particularly transportation. Therefore, it is impossible to significantly reduce road freight transport, without affecting realization of the city's needs and its inhabitants. On the other hand, with the growth of vehicle-kilometers ratio, its negative

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impacts on the environment are also increasing, while congestion in urban areas threatens to become an even bigger problem (Tadić & Zečević, 2015, 2016).

The increase in freight vehicle-kilometers ratio in the city is the result of different trends in the environment. Among the most significant are the logistics sprawl and the growth of e-commerce. High land leasing prices and the tendency for centralization of supply chains caused the relocation of logistics systems from central urban city areas to suburban areas. This phenomenon in the literature is known as the logistics sprawl (Dablanc & Rakotonarivo, 2010) or logistics suburbanization (Allen et al., 2012). There are numerous positive effects of this trend, but also some disadvantages. One primary disadvantage is increasing the distances that vehicles must cross from the central zone of the city, therefore higher emissions.

Another significant trend is the growth of electronic commerce (e-commerce). E-commerce includes trade transactions between organizations and individuals, based on digital technology. Since the implementation of orders created by e-commerce carry out home deliveries to customers, this trend in some ways goes against the trend of suburbanization logistics. Delivery size for the home order is small, often no larger than a standard shoe box. Also implementation requires a greater number of start vans, a larger number of stops, and the involvement of more people.

2. LOGISTICS SPRAWL

Logistics sprawl or logistics suburbanization, envisions dispersed logistics systems and distribution centers in urban metropolitan areas. Logistics sprawl is a noticeable trend in the last few decades in major cities around the world, especially in cities with intensive logistic activities (EC, 2016; Dablanc & Ross, 2012). Despite the higher leasing land prices, there is a tendency to concentrate logistics systems and locate them in the "mega regions" rather than in small, isolated areas. Mega regions can be defined as a large city "network" and areas that surround them. Mega regions are spatially and functionally linked to economic, infrastructural, and environmental relations (EC, 2016; Ross, 2009). Reasons for polarization or concentration of logistics activities in large metropolitan cities are: centralization of supply chains, the size and importance of the local market, proximity to major infrastructure nodes, developed labor market, and commercial activities and systems (Tadić & Zečević, 2016a). However, cities are faced with a lack of space in urban planning and logistics systems are suppressed from urban to suburban areas.

Although the logistics sprawl has a strong impact on city logistics, there is not much research on this topic. The most likely reason is the lack of database parameters and their continuous monitoring. This project presents the results and the impact of the logistics expansion in two cities of different size and their geographical characteristics.

Paris (France) on one side, a large monocentric city that is also involved in an important megaregion. The other is Gothenburg (Sweden), a small town, which is not included in the megaregional context, but through its territory passes the important inter-regional corridor that leads to the capital which is 470km away. In Paris, the analysis was done about metropolitan areas and locations of terminal companies engaged in express delivery and realization of parcel shipments, in the years 1974 and 2010. Package and express delivery carriage covers about one third of the urban freight transport (regarding deliveries with commercial vehicles). The average distance from the town center to the terminal ranged from 6.3km in 1974 to 18.1km in 2010. Therefore, relocating logistic centers for shipping and express delivery companies increased the distance between the terminal and the place of delivery of shipments by an average of 10km in each delivery. The relocation of logistic systems away from the city generated an additional 16,500 tons of CO₂ in 2010 compared to 1974 (EC, 2016; Andriankaja, 2014).

In the wider region of Gothenburg, an analysis of deployment and location of logistic systems was done for the years 2000 and 2014 (Heitz et al., 2016). The average distance from the center to which they gravitate increased from 79.3km in 2000 to 81.4km in 2014. At the same time there has been a centralization of logistic systems so that the distance to the nearest neighboring center decreased from 25.5km to 13.3km. Logistic facilities are moved to new locations, near the main road corridor between Gothenburg and Stockholm, and close to the other larger settlements. The existence of large seaport in the area of Gothenburg contributes to the increase of the number of logistic facilities, by more than 30% in a period of 2010-2014 (EC, 2016; Heitz et al., 2016).

Surveys conducted in several cities of Europe, America and Asia for the CityLab project (EC, 2016) indicate a change of the average distance from the center of logistics facilities to the place which they gravitate towards. In all cities with the exception of Amsterdam, Belo Horizonte, Rotterdam and Seattle, there has been a trend of suburbanization, i.e. logistics sprawl, which means an increase in the average distance from the center. The average increase ranged from 1.2km (Toronto) to 11.8km (in Paris). An interesting fact is that the average increase in the distance from the gravitational center within one year amounts to 0.45km (EC, 2016).

3. E-COMMERCE

The trend of development of new forms of commerce (e-commerce or a trade from home) and the growth in demand for home delivery pose special challenges for future planners and decision-makers in the city. Realization of these flows on the existing forms is less economically efficient and environmentally friendly. The largest number of home and courier express deliveries does not draw attention to logistics and its providers, which are not interested in this market segment, due to a number of problems of realization (Tadić & Zečević, 2016a, Hesse, 2002). Prices for these services are relatively high and are considered the biggest obstacle for future growth. In addition, delivery failures that can occur if the customer is not at home at the time of delivery create additional transport and environmental problem (Tadić & Zečević, 2016a, Edwards et al. 2009). In order to address the growing problem of the e-commerce system, it requires the specialization of city logistics, planning, and implementation of a network of stations for the delivery and receiving of goods (CDP, *Delivery Collection Point*). Using this system solves the problem of failed home deliveries while research shows significant effects on the shopping drives (Tadić & Zečević, 2016a, Song et al. 2009).

B2C (Business to Consumer) forms the backbone of e-commerce. Global sales through e-commerce in the form of B2C increased rapidly over the last decade. B2C is driven by the increase in the number of users of modern technologies, particularly the Internet, as well as changes in user's behavior when buying goods and services. It is estimated that in 2014 total worldwide sales of goods and services via e-commerce has reached a value of \$1.9 trillion. In the form of B2C e-commerce, China is leading, followed by the United States and the United Kingdom. However, sale of goods and services via e-commerce has achieved more reverse effect than expected. E-commerce, when it comes to goods, increased the number of trucks driving in the city and led to the fragmentation of shipments, increasing the number and frequency of deliveries. According to a study from 2014 conducted in the UK, in 2013, shipments - packages, no larger than a standard shoe box, accounted for 59.5% of the total number of delivered goods that were ordered online, i.e. through a system of e-commerce, with an expected increase in the share of 42% between 2013 and 2018 (EC, 2016). On the other hand, when it comes to services, e-commerce has enabled the elimination of unnecessary movement of customers, allowing services to be purchased online, or that some products such as books, music and similar to be downloaded from the Internet (EC, 2016). Increasing the volume of e-commerce has led to the growth of urban freight transport deliveries to residential and business districts, previously dominated by personal transport, i.e. personal transport vehicles.

3. CONCLUSION

The trends of logistics suburbanization and e-commerce have opposite principles. Suburbanization involves the relocation of the logistic facilities to the outskirts of the city, in order to centralize supply chains and reduce the number of transport vehicles, which delivered the goods to the logistic centers in the city. In contrast, e-commerce requires greater engagement of delivery vehicles for delivering the goods ordered and purchased mostly through the Internet. On the one hand, the goal is to reduce the number of points of receipt in macro-distribution flows (logistic centers), and on the other hand, the number of delivery points in the micro-distribution is significantly increased (delivery on home address). In addition, it is noticeable that the size of single delivery decreased, while at the same time increased the number and frequency of deliveries, especially at home addresses

Both trends have significant negative impacts on the sustainability of the urban environment. Initiating a large number of delivery vehicles, increases the kilometers travelled by each vehicle, increases the energy consumption and emissions, burdens the road network and creates congestion, and reduces the accessibility and safety of traffic in the city. Analysis of these trends should be of concern to local authorities and urban planners. Without an adequate impact analysis and the concept of city logistics, there is a risk of loss of the vitality of the city and the quality of life in the city.

ACKNOWLEDGMENT

The idea for this work I've got by studying City Logistics. I express my gratitude to Prof. Slobodan Zečević and Asst. Prof. Snežana Tadić for the support, guidance and suggestions when creating the work.

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