

THE ADAPTATION OF POLISH EXPERIENCE FOR THE DEVELOPMENT OF URBAN LOGISTICS IN UKRAINE

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Abstract: The paper describes the problems of urban logistics and its solutions for the efficient city service and city development. The paper presents the analysis of the main research and pilot projects in urban logistics and Polish participation in these projects. Particular attention was paid to the analysis of urban logistics best practices in the field of people, cargo and information flows in relation to the cost of their implementation. An approach to the implementation of Polish experience in urban logistics in Ukraine is presented. Sustainable urban mobility plans (SUMP) and sustainable urban logistic plans (SULP) was suggested for Ukrainian cities. Solutions for people movement and cargo flows were proposed. These solutions should be comprehensive and include transport system development strategy including SUMPs and taking into account the development of urban areas.

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1. INTRODUCTION

The growth of urban population, increasing number of vehicles, the developing freight flows, environmental degradation and growing demands on the quality of life lead to the changes in the city management, urban planning and city development strategies. Under these conditions, it becomes especially important to develop urban logistics as a tool to improve the quality of life through the implementation of sustainable logistics functions. Although in the EU a large number of policy measures in the urban logistics have been imposed, this subject is only beginning to be studied in Ukraine.

2. THE PROBLEMS OF URBAN LOGISTICS

The approach to urban logistics varies among different scientists. For example E. Taniguchi (2001), A. Benjelloun and T.G. Crainic (2008) consider only urban freight transport and the movement of goods in the city, but such scientists as J. Szołtysek (2009), J. Witkowski and M. Kiba-Janiak (2014), B. Tundys (2013) takes to account the movement of people in their research of urban logistics.

The object of urban logistics studies is the logistics system of the city. And the aim of city logistics is to globally optimise logistics systems within an urban area by considering the costs and benefits of schemes to the public as well as the private sector (Taniguichi, 2001, p.7).

According to J. Szołtysek (2009) the subject of city logistics studies is the flows of goods and people within the city logistics system and flows of accompanying information.

Based on the general logistics concept, urban logistics decisions must be based on the cost-benefit terms, but in the forefront of citizens` quality of life. The strategic decisions of urban logistics should include effective tools, such as telematics, to organize and coordinate logistics flows in the cities. One of the toughest challenges for cities nowadays is urban mobility. It requires careful research, analysis and big investments. The theory of logistics draws attention to the flows integration. For instance, the use of multimodal travel, using at least two modes of transport in a city travel. This requires coordination and organization an appropriate transport infrastructure.

According to international organizations, transport problems are one of the biggest challenges for the city functioning and will need the most investment in the next 5–10 years (GlobeScan and MRC McLean Hazel, 2007). It is estimated that the cost of transport logistics will increase to 5.98 trillion US dollars in 2020. (Frost & Sullivan, 2015)

The increasing urbanization leads to the growth of freight flows and therefore freight transport. The municipal authorities do not coordinate freight transport in cities, which share is about 12–15% of all urban transport. Nevertheless the impact of such transport is significant because of infrastructure needed, traffic disturbances, environment pollution and other problems. One-third of trucks drive without load and the average weight of the transported cargo is 50–200 kg. Thus coordination of freight transport would not only help to reduce pollution and traffic but also help to reduce empty run and transport costs.

In passenger transport an important problem is appropriate modal split between different modes of transport.

Urban logistics for economic, social and environmental purposes uses organizational, legal, financial, infrastructural, spatial, technical and technological, and environmentally friendly instruments. Although these instruments are often used combined, for example in charging systems for access and infrastructure (Road Pricing, City-Maut, Congestion Pricing), in intelligent transport systems etc.

Urban logistics spending is suggested to amount for 5.98 trillion USD in 2020, of which 55% will account for transportation and distribution, 23% for warehousing and 22% for value-added. (Frost & Sullivan, 2015) Such situation cause significant changes in urban freight transportation and must lead to changes in logistics management.

An important role in urban logistics play local authorities that solve conflicts between city stakeholders, logistics parties, ensuring sustainable city development at the same time. Local authorities should strive to ensure high social, economic and environmental standards of living in the city. They should be initiators, motivators and coordinators of logistic solutions to improve the flow of people and goods within the city.

3. THE ANALYSIS OF URBAN LOGISTICS IN POLISH CITIES

The analysis of transport policies in Polish cities in the years 2000–2015 and for the next years shows support and development of sustainable transport through a number of measures such as the development and promotion of public transport, development of cycling infrastructure, implementation of traffic management systems etc. (Zawieska & Skotak, 2015). Nevertheless these documents often lack detailed instruments and measures, monitoring and assessment provisions, and sources of funding. White Paper „Transport 2050 – Roadmap to a single European transport area” focuses on a competitive and resource efficient transport system. To achieve the European Commission’s vision of the future transport key measures and initiatives are proposed in the document, including integrated urban mobility, multimodal transport of goods, innovations for sustainable urban mobility, a regu-

latory framework for innovative transport, modern infrastructure and smart funding etc. (European Commission, 2011)

Using best practices have become one of the most popular methods of solutions implementation for urban logistics and is promoted, among others, in the Action Plan on Urban Mobility by the European Commission. A number of projects in the field of urban logistics have been implemented in the EU, which concerned the flow of cargo and people. The table 1 presents the main research and pilot projects and the participation of Polish cities in them.

Table 1. European research and pilot urban logistics projects

The main areas of activity	Period	Poland participation	Transportation of people	Transportation of goods
Project name				
BESTUFS I, II	2000-2008			
CITY FREIGHT	2002-2004			
eDRUL	2002-2004			
CIVITAS I, II, Plus, Plus II	2002-2016			
CITYPORTS	2003-2005			
SUGAR	2008-2012			
CITYLOG	2010-2012			
TRAIBLAZER	2010-2013			
C-LIEGE	2011-2013			
Cyclelogistics	2011-2014			
POLITE	2012-2014			
BESTFACT	2012-2015			
ENCLOSE	2012-2014			
SEEMORE	2012-2015			
CH4LLENGE	2013-2016			
GRASS	2013-2016			
TRANSFORuM	2013-2015			
NOVELOG	2015-2018			

These projects establish cooperation between experts in the fields of logistics, transport and the stakeholders in urban logistics, and ensure the transfer of knowledge and best practices among cities. These reference models can help decision-makers to choose the best practices of urban logistics, taking into account the flows of people, goods and information to reduce congestion, air pollution and improve the quality of life of residents. Poland has participated in the projects SUGAR, CIVITAS, ENCLOSE, POLITE, C-LIEGE, Transforum, Seemore, CH4LLENGE and is a partner in GRASS and NOVELOG

Many projects in urban logistics are aimed at:

- the collection and analysis of best practices in the researched field and transfer of the experience,
- improving the quality of public transport,
- limiting traffic in the city center, including the organization of deliveries to the city centers by the ecological transport,
- range of alternatives in relation to the existing communication, the alternative transport both for people and cargo,
- the promotion and dissemination of knowledge on urban mobility among residents and municipal authorities, etc.

Good practices in urban logistics can be structured using the matrix, suggested by J. Witkowski and M. Kiba-Janiak (2012) according to the type of transport (individual, public, freight), perspective cost implementation of solutions (low – medium – high-cost) and the level of customer expectations. For our analysis we will use the cost of implementation and the type of flow (people, goods and information).

In the bigger Polish cities intelligent transport systems are mostly high developed and integrated, but smaller cities may use applications to control traffic lights on single intersections and roads.

The basis for the efficient management of people and cargo flows is the implementation of innovative solutions with regard to all stakeholders. One of the best instruments of urban logistics in the transportation of goods are targeted delivery by hybrid cars or electric cars and its combining. The low emission zones with the entry restriction for some types of transport could not be applied in the Polish cities due to the law. Good solutions of urban logistics such as the use of cargo trams (e.g. Cargotram in Dresden), inland waterways for goods transportation (e.g. in Paris) and the use of ecological transport for last mile logistics have not been yet introduced in Polish cities.

The high-cost solutions in the transportation of goods require large investments, and include e.g. construction of urban consolidation centres, logistics centers, urban terminals. The best solutions in this group have cities in Germany, Japan, France, the Netherlands, Italy. Cargo consolidation in urban logistics centers or urban consolidation centers can increase the capacity utilization of vehicles and the efficiency of the delivery itself. Polish cities don't use urban consolidation or logistic centers, because they require large investments and a comprehension between all stakeholders: local governments, residents, logistic operators, shippers. The implementation of urban logistics solution require the usage of quantitative methods, the simulation and optimization models.

Table 2. The examples of urban logistics best practices in Polish cities according to the type of flow and the cost of implementation

Cost of implementation	Low-cost	Middle-cost	High-cost
People	entry restrictions on cars in some areas, mostly in the city centres (Cracow and most big Polish cities); bus lanes for public transport (in most big Polish cities); educational and promotional activities of sustainable urban mobility (Mobility in Gdynia (Gdynia mobilna), carpooling, car free day).	public bikes rental (KMK Bike in Cracow, Veturilo in Warsaw); integration of electro-nic tickets for public transport within different types of transport (integration with rail-way in Warsaw); equipment to facilitate movement of people with disabilities (100% low-floor buses in Cracow, used in most big Polish cities); public transport on demand (Telebus in Cracow, Szczecin).	the construction of ring roads and modernization of roads; the construction and modernization of cycling infrastructure, linking it to the network (Wroclaw, Jaworzno); the construction of Park & Ride (Warsaw, Cracow, Poznan, Wroclaw); light rail (Cracow, Poznan) intelligent traffic control systems, intelligent transport systems (TRISTAR in Gdynia, Gdansk, Sopot; SNRT 2000 in Warsaw).
Goods	limiting the entry of freight transport to a designated area with specified time limits (in most big Polish cities).	freight bikes for transporting goods (freight bikes in Warsaw bike rental, system of freight bikes delivery to the city center is being designed in Cracow); self-service parcel pick-up station (in most Polish cities).	Not applied in Polish cities
Information	applications to control traffic lights single inter-sections; Automatic Vehicle Identification (for the entry control in the city centers); logistics clusters for knowledge sharing and integration of logistics services.	radio data transmission systems; centers of traffic information for travelers; fleet management systems.	Intelligent transport systems (Warsaw, Tricity, Cracow, Poznan); systems for control of paid parking; intelligent traffic control systems.

4. METHODOLOGY APPROACH FOR PRIORITY DIRECTIONS OF THE URBAN LOGISTICS DEVELOPMENT IN UKRAINE

The implementation of urban logistics projects requires adequate vision, strategic plans, organizational and legal base. The model of the city development and city logistics have to be settled in the relevant documents: development strategies, policies, action-plans, etc.

Analyzing the other countries` experience in the implementation of urban logistics projects, the research and practical projects can be distinguished. It is important to carry out research projects before practical ones. As a part of research projects the current state of urban logistics have to be analyzed, which could reveal the existing problems and needs of the stakeholders and identify possible solutions. Both types of projects should be accompanied by residents polls, consultations with them, and involvement in these projects.

Using the matrix of urban logistics best practices in Polish cities according to the type of flow and the cost of implementation, it seems better to implement the low-cost projects in Ukrainian cities. But such approach will not give the expected results because the low-cost projects must support the high- and middle-cost projects for the long system development.

For example, the Ukrainian Transport Strategy until 2020 (Ukrainian Transport Strategy until 2020, 2010) envisages the development of public transport, although at the same time it established the growth of parking space, that would enhance the use of cars. Such unreasoned steps lead to the decrease of public transport usage and increase of private cars.

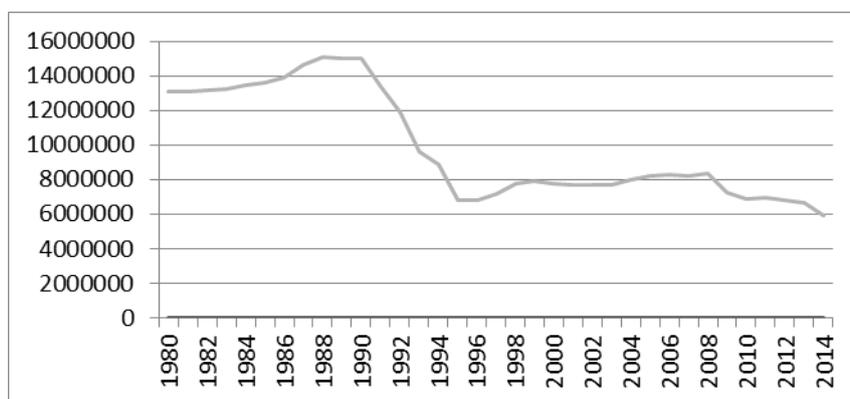


Fig. 1. Number of public transport users in Ukraine, 1980-2014 (State Statistics Service of Ukraine)

At the beginning of 2016 the average number of cars per 1 000 inhabitants in Ukraine for the first time exceeded 200 cars (202), and the average age of these

cars was 19,6 years (including freight) (AUTOConsulting). In Kyiv the number of cars is 353 per 1,000 inhabitants. So sharp increase in the number of cars, especially due to their age indicates a very negative trend in Ukraine. Such a condition causes an increase in pollution and road accidents.

There is a lack of information on urban logistics in Ukrainian cities, especially on freight transport and the available information is collected in an uncoordinated manner, and is difficult to compare. The main problem in the field of urban logistics, we believe is a lack of a comprehensive approach and cooperation of municipal authorities and other stakeholders.

For the implementation of urban logistics model it is necessary to analyze the needs, requirements and priorities of the city and its inhabitants; to identify the potential sources of streams of goods and people (housing, service and industrial infrastructure, etc.); to analyze the existing transport infrastructure; to study the demand for sustainable, efficient transport and logistics solutions for the distribution of goods.

One of the important elements and instruments of urban logistics is the Sustainable Urban Mobility Plan (SUMP), which is a strategic plan designed to meet the transport needs of people and businesses in the cities, and to achieve a better quality of life. Mobility plans should be developed not only for the cities, but also for the institutions that generate traffic, such as universities, large industrial or service organizations. Such plans are envisaged in most transport policies of Polish cities and should be envisaged in Ukrainian ones.

An important element of SUMP should be Sustainable Urban Logistics Plan (SULP), which focuses on optimizing process of urban logistics, specifically freight transport in the city in order to reduce energy consumption and environmental impacts, yielding economic equilibrium. The SULP elements are as follows (Ambrosino, 2015): setting the objective and target; urban mobility scenario and priorities; analyze the logistics context and processes; setting requirements and logistics baseline; identified measures and services vs. requirements; service design; organisation, business model and contracting; assessment and impacts evaluation; roadmap to adopt the SULP; responsibilities and implementation/monitoring plan; promotion and communication Plan. All the steps must be discussed and assessed with the local stakeholders.

Recommendation for the municipal authorities are as follows:

- the implementation of mobility management instruments, including influencing people's travel behavior;
- encouraging large employers and other traffic generators (universities, shopping centers, state institutions) to develop mobility plans;
- the introduction of a position of urban mobility consultant in the municipal administration for consultation and coordination of urban mobility initiatives, substantive support to create mobility plans, educational and promotional activities;

- the development of urban transport systems as well as cycling infrastructure;
- the use of restrictive instruments (limited traffic zone, paid parking zones, etc.) together with the development of public transport and cycling.

Development of cycling and walking movement should be the core projects of urban mobility in Ukrainian cities because of their low cost and high performance. Street should be available to all, including people with reduced mobility (the disabled, the elderly). Adapting the city to the needs of such people is a multi-faceted task and one of the main in developed countries due to the increase in the number of older people.

Effective management of urban freight transport must start with an analysis of the current situation. The only used instrument in Ukrainian cities in this field is the limited traffic zones with limited hours for the maintenance supply. Polish cities took part in various urban logistics projects, but their solutions in this regard are also very limited. Ukrainian cities could implement such solutions of urban logistics in the transportation of goods from the best practices of other cities:

- vehicle weight and size regulation together with time regulations;
- allowed night deliveries;
- assigned loading zones in the central parts of the cities;
- freight transport partnership using ITS for urban freight;
- encourage use of environment-friendly vehicles;
- urban freight information, maps, signing;
- the development and increase of parcel stations/locker boxes;
- special conditions for sustainable urban planning.

Urban Consolidation Centers (UCC) are used in urban logistics to assist in achieving economic, environmental and traffic objectives, but there are many oppositions to their implementation. There are no good example of UCC operating in Poland, therefore we do not suggest to implement it in Ukraine.

The integration of the chosen solution can be made using the complementarity matrix and the integration diagrams used in Szczecin for its adaptation of good practices solutions (Iwan & Kijewska, 2014).

5. CONCLUSION

The use of urban logistics concept, efficient management and coordination of logistics processes in the city, not only create conditions for a more comfortable living, increase the attractiveness of the urban space, but includes also economic and environmental benefits. Selection and implementation of good practices in the urban logistics require integrative activities. Effective solutions must be comprehensive and include infrastructure, legal issues, environmental services, information technology and "soft" instruments. The proposed solutions for the

movement of people and goods should assist the objectives of the city development strategy. All these measures and tools should be integrated and efficiently designed with the help of SUMP and SULP. It is required to continuously collect and update information and data, using the progress of technology and management. The main objective and criterion of assessing the urban logistics model is its impact on the quality of life of people.

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BIOGRAPHICAL NOTES

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