



LOGISTICS IN THE CITY MANAGEMENT SYSTEM

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Abstract: The dynamic development of cities and the growing needs of the inhabitants make the issue of the functioning of people and goods movement more important than ever. With the increase in the intensity of the streams of the city, the cities themselves are beginning to face increasing problems arising from this phenomenon. The increase in the number of inhabitants, the increasing consumption are factors that greatly influence the flows of goods taking place within the city. This illustrates the apparent difficulty in coordinating the flow and ensuring that they are as efficient as possible. This is due to the progressive changes in the way people live, the decentralization of society, the development of urban transport hubs and the increasing importance of transported goods.

Keywords: city logistics, transport

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Introduction

The operation of urban centers means that it is possible for one to move independently of the reasons that cause communication needs and the way of transportation. With the increasingly tightening of economic links within cities, and in particular large urban agglomerations, the importance of urban logistics has increased. It is considered as a tool for solving problems in the functioning of highly urbanized areas such as urban agglomerations. Although theoretical foundations of logistics knowledge, such as urban logistics, are not yet sufficiently developed, many definitions and concepts have already arrived.

City logistics area

Urban logistics has grown on the basis of well-known, basic logistic principles, and defining activities. The city logistics as a relatively new field of science has a central role in the management of the city, which creates a transparent structure for the organization and management of the city's resources. It distinguishes the following areas, which are the subject of research and the need for logistic solutions:

- supply of water, gas and heat,
- organization of passenger and goods transport,
- issues of transport and disposal of municipal waste and waste water treatment,
- shaping the transport links of the agglomerations with the logistic system of the macroregion (Tomaszewska 2001, p. 105).

The implementation of these aspects in the field of city logistics should ensure optimum conditions for the city functioning, taking into account the costs, performance and services of urban entities. There are three streams of flow:

- material stream,
- financial stream,
- information stream (Tundys 2008, p. 84-88).

Logistic infrastructure can also be distinguished in city logistics (Szałucki 2008, p. 151), where information systems for logistics activities are created. In addition, urban logistics covers the metropolitan emergency area in crisis situations, ie calamities, accidents.

If the city is considered to be an area integrating the economic space of activities related to the management of physical and human resources, it is the task of urban logistics to combine into one controllable system the activities of those economic entities which are responsible for ensuring the proper conditions of this economy (Quak 2011, p. 34).

Urban logistics can be defined as the whole process of managing the flow of goods, cash and information according to needs and in order to develop the city and taking into account the problem of environmental protection, assuming that the city is a social organization aimed at meeting the needs of its customers – the inhabitants of the city (Nowakowska-Grunt, Chład 2015, p. 137). The needs of the city are the sum of the needs of its inhabitants, which include such elements as:

- mobility needs,
- the need to work, to produce and generate,
- the need to acquire goods and services,
- need for information (Szołtysek 2009, p. 57-59).

Entities operating within the city form the flow of material goods, cash and information in the process of their needs satisfaction. The task of urban logistics is to optimize these flows. This task is about identifying, analyzing and creating the hierarchy of the needs of the entities that make up the logistics system (Pabian 2013, p. 4-5). The stage should be identified by flows generated during the implementation of the needs, and then finding solutions to optimize those flows and methods, the means of its implementation, which serves the model of tasks and points of interest of urban logistics as presented in *Table 1*.

Taking on the starting point of known logistics definitions developed by the Council of Logistics Management, urban logistics can be defined as the process of planning, executing and controlling flows, ie:

- flows initiated outside and directed to the city,
- flows initially launched in the city and directed outside,
- flows passing through the city,
- flows within the city (Witkowski 2010, p. 120-122).

Table 1. Model of tasks and areas of interest in urban logistics

<i>Urban logistics</i>	
<i>Decision making factor</i>	<i>Objective</i>
SUPPLIERS – manufacturing and service companies, industry, wholesalers, hypermarkets, service points.	Availability of node points, profitability and development, availability of information, reduction of operating costs.
SUPPLIERS OF TRANSPORT AND LOGISTIC SERVICES – transport and forwarding, post, courier services, passenger and road passenger transport.	Access to linear and point infrastructure, development and profitability, access to information, cost reduction.
MUNICIPAL AUTHORITIES – local government institutions.	City development, ecological social objectives (optimal satisfaction of residents' needs, protection of the environment), Access to linear and point infrastructure.
RECIPIENTS OF GOODS AND SERVICES – retailers, small shops, individual customers.	Availability of products and services, availability of infrastructure - mobility, access to work, information and living in the city.

Source: Own study based on (Szołtysek 2009)

The accompanying information flows aim at meeting the needs of urban agglomerations in the field of quality of management, quality of life and development. In urban logistics it is proposed to replace the existing, uncoordinated arrangement of various types and intensity streams with a coordinated system, oriented on the entities operating in the city and its inhabitants, and consequently on the development of the city. We are talking about the integrated management of transport systems in the city. This is to eliminate chaos, the pathologies of urban traffic and prevent transport paralysis. Logistics in relation to the city points to the need to ensure optimum productive and spatial and existential-spatial relationships of a transport character, taking into account costs, the type of services provided to individual entities, assuming the economic and ecological development of the agglomeration. In the definition of urban logistics developed by the Council of Logistics Management, the adjectives “efficient” and “economically efficient” (Cisowski, Szymanek 2006, p. 15) are not automatically and unconditionally attributed to flows. They should not always be used, but of course they mean to be used where possible. Flows should be economically efficient, but above all, the welfare of the population and the development of the city should be taken into account (Stabryła 2000, p. 115).

The conditions under which logistical processes are implemented should take into account the socio-economic objectives, while economic operators respecting them take reasonable decisions and maximize their profits (Kowalik 2015,

p. 22-34). It is important to note the potential of urban logistics optimization, which outlines both definitions. The first is urban logistics as a process of optimizing all storage and transport activities undertaken by businesses in the city, taking into account the environment of these processes, transport congestion and energy consumption, in a market economy environment (Świerczek, Szozda 2014, p. 381). The second definition presents urban logistics as the point of delivery assumed for optimizing the city system in terms of planning, control and monitoring of all economically, ecologically, technologically and socially conditioned processes in the system. In other words, urban logistics refers to all these activities conditioned on the movement that make up the daily life cycle of the city as an economic, social and cultural space. It is the basic instrument of efficient management of the life of the modern city, including the reliable functioning of its technical infrastructure and transport system (*Figure 1*).

CITY LOGISTICS Optimization of the city's logistics system in the following areas:	QUALITY OF LIFE Areas affecting the quality of life of inhabitants of urban agglomerations:
<ul style="list-style-type: none"> • including transport of tangible goods and media, • transport and storage of municipal waste, • collective and individual communication, • the storage of material goods in the industrial and commercial districts and in the commercial networks of the city, • control flows of persons and material goods. 	<ul style="list-style-type: none"> • social cohesion and commitment, • public safety, • culture and free time, • economic prosperity, • transport and availability, • education and continuing education, • environment, • health and social conditions, • flats.

Figure 1. Connection of urban logistics and quality of life

Source: Own study based on (Szymczak 2008)

Applying the principles of urban logistics contributes to achieving both economic and ecological goals. The aim of urban logistics is to combine the activity of all economic entities and institutions operating within the city with a mobility aspect and to manage this network of events in a way that ensures the desired level of quality of life and management in the city at a minimal cost but meeting ecological requirements in the same time (Brzozowska, Grabińska, Imiołczyk 2016, p. 57-58). Coordination of activities also includes the appropriate organization of community services provided to economic entities and the population (Grondys, Kott, Sukiennik 2017, p. 237-245). In such a general objective, one can distinguish a new aspect in a comparison with the logistics of enterprises:

- economic purpose,
- ecological focus,
- social purpose (Chandler 1962, p. 35).

Objectives of urban logistics

The long-term objectives of urban logistics should be to ensure the development of the city in a coordinated arrangement of all three dimensions (Sukiennik 2012, p. 40). Once you have set the objectives, you can ask yourself how to implement them and what the decision makers and planners must know (Siuta-Tokarska 2013, p. 21). Urban logistics is a field of interdisciplinary and multidisciplinary knowledge. This means that as a matter of interest it covers many areas of science and practice. The most important are: computer science, economics and technology (Strzelczyk 2013, p. 118). It should be emphasized that all these issues are useful to the city and their knowledge and practical use contributes to its development. In particular, this applies to areas such as urban planning, urban economics, spatial planning, transport policy, traffic engineering, road transport, environmental policy (Witkowski 2008). These functions include economic, logistics and transport, or information and communication functions (Chłąd 2011, p. 144). Due to the fact that the cities differ from each other, the functions performed by each of them are also varied (*Figure 2*).

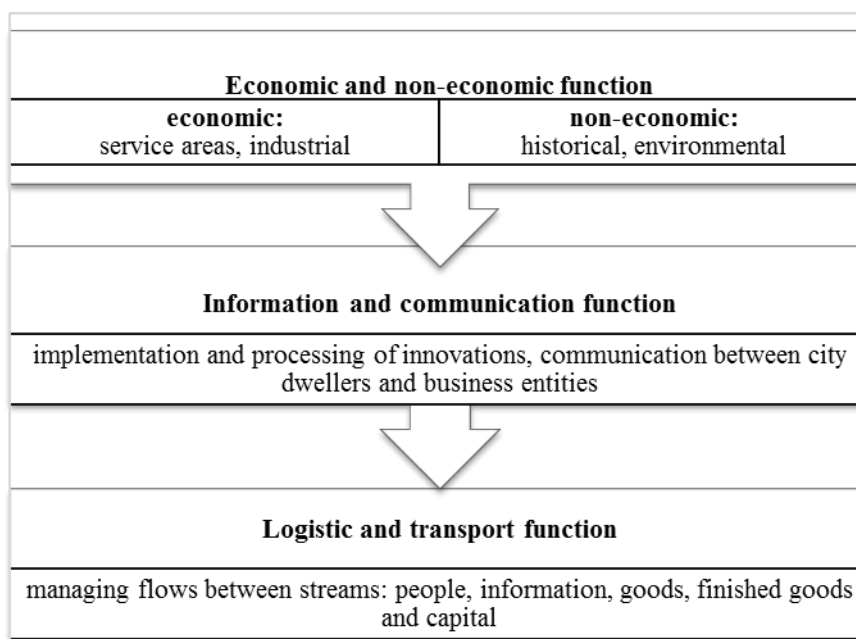


Figure 2. Basic functions performed by modern cities

Source: Based on (Tundys 2008)

Each of these specific features is a reflection of the innovative approach to urban traffic engineering, which is referred to as urban traffic engineering logistics. It is in fact a set of interdependent, infrastructure harmonizing and organizational activities in managing the flow of people, cargos and information flows (Ziemkiewicz 1999, p. 107-110):

- in the right place and in the channelized distribution,
- in due time and without delay,
- in the right technology and with the appropriate measures and their compatibility,
- with constant monitoring of the reliability of distribution, demand and supply in terms of quantity, quality, availability and space and customer expectations,
- taking into account the substitution of services in the area of logistics engineering urban traffic,
- competitive, with alternative infrastructure and stream organization,
- at the expense satisfying the manufacturer and the distributor and meeting the consumer's (customer's) expectations,
- at the acceptable global, social costs,
- with respect to ecological, material and information safety (Taniguchi, Thompson, Yamada 2013, p. 49-60).

In this context, the following planning and organizational actions should be taken into account:

- organization of the total necessary transport of the city to service people, cargos and services with logistic means and instruments,
- use of logistical thinking in the field of competing demands on limited resources of downtown space,
- space planning perceives the problems and boundary conditions of bulk traffic, their distribution and transit in the area of dense investment to increase the overall usable value,
- the study of the supply of personnel and equipment in high development density areas by organizations and technical means of transport systems and using methods of planning and mathematical logic,
- to optimize the transport in and out downtown of all goods and services required by the social and individual economic needs,
- transport in and out of urban areas, with the means of passenger transport and economic traffic,
- planning, organizing, controlling transport system in both directions, inside and outside the city,
- land transport organization, taking into account the requirements of loading and unloading companies, cargo recipients and transport units, and in accordance with individual and public traffic (Gołemska, Czajka, Tomaszewska 2001, p. 27) (*Table 2*).

Table 2. The needs and implications of transport in the city

<i>Passenger transport</i>	<i>Transport implications</i>
Food	Transportation of people to shopping centers
Ensuring jobs	Transport of people between workplaces and places of residence
Education	Transportation of people to schools, educational institutions
Residential	Infrastructure of roads, car parks, garages
Traffic	Transport infrastructure, roads, pedestrian walkways, parking lots, cycle paths, public transportation system, bus stops
Healthcare	Arrivals to the facilities, parking lots, airfields, emergency and rescue systems
Urban safety and comfort	Signage system, evacuation routes, snow removal, cleaning systems, noise protection, collision-free intersections, transport education

Source: Own study on the basis of (Tundys 2008)

In the theory and practice of urban logistics, the concept of urban logistics is often seen as an individual system. Urban logistics is also a tool for solving problems of highly urbanized areas, ie the agglomerations to which the city belongs, so the term is considered to be the most appropriate (Kiba-Janiak 2015, p. 24). The aim should be to effectively control the flows of all resources within the city between its subsystems and meet the expectations of city users at an appropriate level (Krawczyk 2004, p. 44). You can also define the aspect of organizational, technical and economic tasks. Organizational determinants influence the shape of logistics structures, the formulation and implementation of the appropriate strategy, and the identification of basic links within the city. When defining system tasks, organizational, economic and technical considerations should be considered (Szczepanik 2016, p. 159). This position allows you to adopt appropriate planning, control and control solutions.

Conclusions

Urban logistics, determined by its interdisciplinary character, has a huge impact on economic, ecological and social factors that improve the city, leading to improvement of the quality of life of its inhabitants. The consequence of such a state is the application of logistic management methods, rules and procedures in the management of the urban system. Among these needs, the requirement of smooth movement and the possibly free access to a wide range of consumer goods as well as resources are of particular importance. Hence, the implementation of transport

functions of the city is currently one of the key challenges for decision-makers. Taking into account all the objectives of interested entities present in cities and linking them with the tasks that logistics management imposes on them is a complicated and very complex process. This is mainly due to the fact that problems and time-consuming implementation of appropriate solutions improving the flow of goods are recognized.

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LOGISTYKA W SYSTEMIE ZARZĄDZANIA MIASTEM

Streszczenie: Dynamiczny rozwój miast oraz rosnące potrzeby mieszkańców sprawiają, że problematyka funkcjonowania procesów przemieszczania osób i towarów z każdym rokiem nabiera jeszcze większego znaczenia. Wraz ze wzrostem intensywności strumieni przepływów miasta zaczynają borykać się z coraz poważniejszymi problemami wynikającymi z tego zjawiska. Przyrost liczby mieszkańców oraz wzrastająca konsumpcja są czynnikami, które bardzo intensywnie wpływają na przepływy dóbr odbywające się w obrębie miasta. Przedstawia to widoczną trudność w zakresie koordynacji procesu przepływu oraz zapewnienia jego możliwie najwyższej sprawności. Nakładają się na to postępujące zmiany stylu życia mieszkańców, decentralizacja aktywności społeczeństwa, rozwój miejskich węzłów transportowych oraz wzrastające znaczenie przewożonych ładunków.

Słowa kluczowe: logistyka miasta, transport