

THE RANGE OF NEEDS SATISFIED BY THE USE OF URBAN LOGISTICS

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Abstract: Urban areas are important centres of entrepreneurship and innovation. Transportation has a key meaning for the proper functioning of modern urban societies, which is struggling with problems related to economic activity. To reach their basic goals, cities are facing a task to encourage entrepreneurs to economic activity; one of the possible ways to achieve this task is to improve the conditions of freight transport. Solutions from urban logistics are pointed out as a practical way of improving the transport-logistic systems of modern cities, which struggle with unreasonable structure of freight, traffic congestion and undesirable influence of transport activities on their environment.

Key words: *Urban logistics, communication, freight transport, public transport*

1. INTRODUCTION

Global economy is in the process of metropolisation through residentialism, communicativity, institutionalism in politics and economy. Metropolisation brings the arguable dichotomy of “urban” and “rural”; “rural” areas in metropolitan area are more “urban” than “urban” areas in the countryside. With tightening economical relations around the cities, especially in large metropolitan areas, rises the importance of urban logistics, which is considered a powerful tool for solving problems of highly urbanized city areas. Although the theoretical foundations of urban logistics are not yet fully developed, they already consist of many terms and definitions [1].

Urban logistics has arisen from well known, unshakable rules of logistics, i.e. the coordination of actions while maintaining a more holistic approach. Urban logistics, as a relatively young scientific field, is based on elements of logistics as a management method, to create a clear organizational structure and manage the resources of the city. It consists of the following areas of research and logistic needs:

- supply of water, gas and heat to the city;
- organizing the public and freight transport in the city;
- problems of waste export and utilization as well as wastewater treatment;
- formation of transport connections of the city with the logistic system of the macro-region.

The solution of the issues listed above should provide optimal conditions for the city with the account of costs, effectiveness, services provided to the municipal entities, as well as environmental protection. All three kinds of flows are accounted:

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- information;
- materials;
- financial [5].

In urban logistics, there is also a logistic infrastructure in which information systems intended for urban logistic actions are created. Furthermore, urban logistics covers a wide variety of emergency actions for the urban area to be used in crisis situations as accidents or breakdowns. Considering a city as an area that integrates all economic activity related to material and human resources management, the goal of urban logistics is to connect all activities of business entities responsible of providing proper conditions of this management in to one, controllable whole [2].

2. OPTIMISING THE SCOPE OF URBAN LOGISTICS

Urban logistics can be defined as a sum of goods, information and financial flow management processes, in pursuance of the needs of the urban area, and to facilitate its development, with the account of environment protection; with the assumption that the city is a social organization, that aims to satisfy the needs of its customers – the inhabitants. The needs of the city are the sum of the needs of its inhabitants, which consist of (among others) the needs of:

- mobility,
- work, production and manufacturing,
- acquisition of goods and services,
- information [8].

In the process of satisfying their needs, entities operating in the rural area create the flows of goods, information, financial and people. The aim of urban logistics is optimizing these flows. This task is first realized by identification, analysis and hierarchy of needs of the entities in a logistic system. The next step should be identifying the flows generated by the entities in the process of satisfying their needs and than finding solutions, methods and means to optimize those flows, as specified in the model of goals and points of interest of urban logistics.

Basing on the well known definition of logistics developed by the Council of Logistics Management, urban logistics can be defined as the process of planning, realization and control of flows:

- initiated outside and directed towards the city,
- initiated inside the city and directed outside,
- passing through the city,
- inside the city [3].

The accompanying flows of information are aimed at satisfying the needs of the city in regard to quality of economy, life and development. Urban logistics proposes the replacement of uncoordinated set of flows that differ in kind and intensity, with a set that is coordinated and aimed towards the entities and inhabitants of the city, and in consequence, the development of the city. An integrated management of transport systems is discussed; it is said it would eliminate chaos, pathologies in traffic and paralysis of transport [6] in industrial and residential traffic areas, with the account of costs, efficiency, and assuming the economical and ecological development of the micro-region, that is the city. In the urban logistics

definition developed by the Council of Logistics Management, the adjectives “efficient” and “cost-effective” should not be implicitly and automatically assigned to the flows [7]. These adjectives should not be used always, but whenever possible. While the flows should be cost effective, the well being of inhabitants and the development of the city should be the priority – that is the social dimension of urban logistics. The conditions of logistic processes should meet the socioeconomic goals, and the entities respecting those goals are being rational and maximize their profits. What is noteworthy, is the optimization potential of the urban logistics presented in both definitions. The first defines the urban logistics as a process of optimizing all actions related to storage and transport, taken by the companies in the urban area, with the account of environment of these processes, transport congestion and energy usage, in a market economy [2]. The second definition presents urban logistics as a mean of optimizing the urban system in terms of planning, controlling and supervising all traffic-relevant processes in the economic, ecologic, technologic and social dimensions [8]. In other words, urban logistics concerns all traffic-related actions, that make up the daily lifecycle of the city, as an economic, social and cultural space. It is the basic instrument of efficient management of a modern city, including a reliable operation of its technical infrastructure and transport system.

Table 1
Model of goals and points of interest of urban logistics [10]

| Urban Logistics | |
|--|--|
| Element in decision making | Goal |
| SUPPLIERS – manufacturing and service companies, industry, wholesalers, megastores, service points | Availability of nodes, profitability and development, access to information, reduction of operating costs. |
| SUPPLIERS OF TRANSPORT AND LOGISTIC SERVICES – transport and shipping, postal and courier services, road and rail public transport | Access to linear and point infrastructure, profitability and development, access to information, reduction of operating costs. |
| LOCAL AUTHORITIES – local government institutions | Development of the city, social and ecological goals (optimal satisfaction of the inhabitants’ needs, environment protection), access to linear and point infrastructure |
| CONSUMERS OF GOODS AND SERVICES – retail stores, small shops, individual customers | Access to goods and services, access to infrastructure – the need of mobility, access to workplace, information and citylife. |

The use of urban logistics helps achieve both economic and ecologic goals. The aim of urban logistics is connecting all traffic-related economic entities and institutions operating in the

urban area into one controllable whole, and managing this network of events in a way that ensures a required level of quality of life and husbandry in the city, with minimal costs, although with regard to environment. Coordination of activities also includes the right organization of municipal services provided for business entities and the populace. In such general goal, several secondary goals can be listed, which differentiates urban logistics from corporate logistics:

- economic goal,
- ecological goal [7],
- social goal [7].

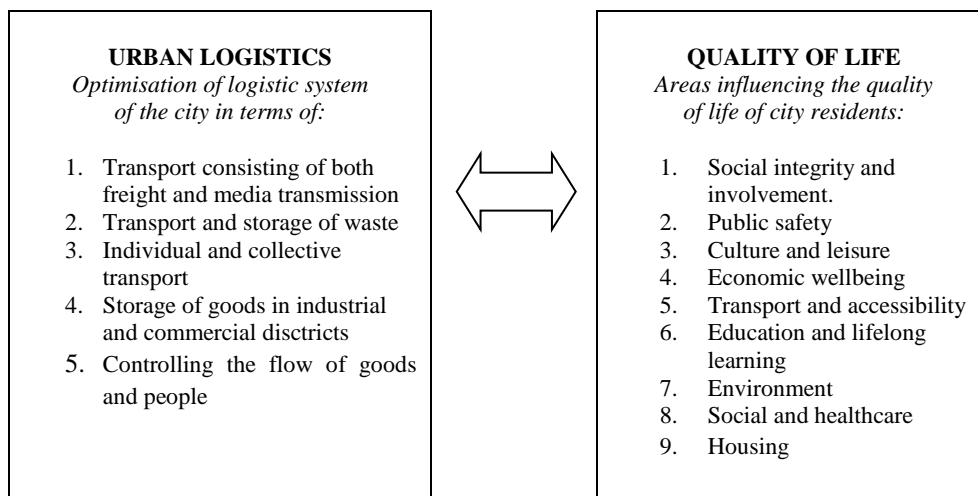


Figure 1. The relations between urban logistics and quality of life [10]

3. INTERDISCIPLINARITY OF URBAN LOGISTICS

The long-term goal of urban logistics should be ensuring the development of the city in a coordinated set of all three dimensions. From these goals arise the questions, how to achieve these goals, and what knowledge should the planners and decision makers have. Urban logistics is an interdisciplinary and multithreaded knowledge domain, which means that it concerns many different fields of knowledge and practice [11]. The most important include computing, economics and technology. It is worth noting, that all of this fields are useful for the city; their knowledge and practical use contribute to the urban development, especially in such areas as: city planning, urban economy, spatial development, transport policy, traffic engineering, road construction and environmental policy [9].

All of those elements in the respective range reflects the innovative approach to urban traffic engineering, referred to as logistic engineering of urban traffic [4]. It comprises a set of interrelated, harmonic infrastructural and organizational actions in managing the flow of people, freight and information:

- in the right place and channelled distribution,
- in the right time and without delays,
- with the right technology and the right means, with the account of their compatibility,

- with constant monitoring of the reliability of distribution, demand and supply in the quantitative and qualitative aspect, as well as the aspects of time and space availability and the customers' expectations,
- with regard to substitutes of services in the area of logistic traffic engineering,
- perceiving competitive, alternative infrastructures and organization of streams,
- with costs satisfying the maker and distributor, with respect of their acceptance by the consumer (customer),
- with acceptable public (global, social) costs,
- maintaining environmental, material, and informational safety [11].

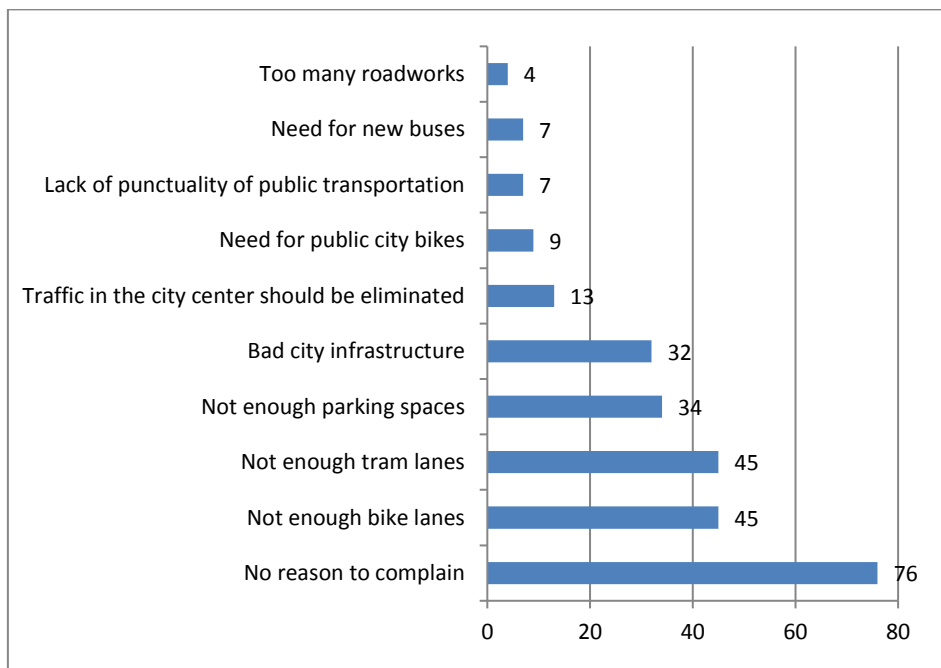


Figure 2. Respondents views on key problems of urban logistics in Częstochowa, Poland
(Own research, N = 120, multiple answer question)

Concentrating on urban logistics, it is worth to note some important aspects of organization and planning:

- organization of the whole necessary transport expenditure of the city on handling people, freight and service provided with logistic means and instruments,
- application of logistic thinking in the field of competitive utilitarian requirements, with regard of limited supply of urban space,
- spatial planning with perception of problems and boundary conditions of collective freight transport, their division and transit in the area of dense investment, in order to increasing its overall utility value,
- the science of supplying the populace and facilities in highly urbanized cities with organizations and technical measures of transport, with the use of methods for planning and mathematical logic,

- optimization of supplying to- and exporting from the city all goods and services required by the social and individual economic needs,
- supply to- and export from urbanized area, wherein public and economic movement are the carriers of effectiveness,
- planning, organizing, controlling and monitoring the system of supply and export,
- organization of economic movement with regard to loading and unloading companies, recipients of goods, entities of transport economy, in agreement with individual and public transport [7].

Table 2
Summary of needs and the implications of transport in the city

| <i>Needs in the area of urban logistics</i> | <i>Transport implication</i> |
|---|--|
| Food | Passenger transport to trade centres |
| Employment | Passenger transport to- and from work |
| Education | Passenger transport to- and from schools, educational facilities |
| Housing | Infrastructure of local roads, parking spaces, garages |
| Communication | Transport infrastructure, roads, walkways, parking lots, bike lanes, public transport system, bus stops |
| Healthcare | Transportation to medical facilities, parking spaces, landing pads for airborne staff, emergency system |
| Safety and comfort | System of warning signs, system of evacuation routes, clearing roads of snow and waste, system of intersections, sound barriers, traffic education |

In theory and practice of logistics in urban use the term “urban logistics” is oftenly treated as a standalone system [9]. It is also considered a tool for solving problems of highly urbanized spaces (cities) which makes “urban logistics” a proper term [10].

4. SUMMARY

The rules and concepts of logistics found their use in urban management. The cause of this requires analysing the genesis of the urban logistics. Cities are centres functioning since the dawn of civilization. Their formation was conditioned by different factors, including satisfying needs, presence of resources or important communication routes. The demographic development of cities was caused by the movement of rural population. With time, it resulted to form massive metropolitan areas. Nowadays, the “magnetism” of cities spans nationwide, sometimes even crossing the borders. The constant development of cities, measured by increase of their area, density of population, and the number of business entities and public institutions located, requires the use of rules of logistic management by the local authorities. The high concentration of people and business entities on a limited space causes significant complications in management. A visible influence of transport network on the formation and development of cities can be observed. The findings from own research presented in *Figure 2* is only an example of how broad the needs of urban logistics can be from the city denizen’s point of view alone. Urban logistics is however far more complex, and should satisfy the needs of different stakeholders, such as local authorities and entrepreneurs. Connecting the demands of those parties through modelling of urban logistics has lately been a popular topic for many researchers [11, 12, 13] and still is a key direction of future research.

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