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AN ASSESMENT OF INDIVIDUAL TRANSPORT IN THE ASPECT OF QUALITY OF LIFE ON THE EXAMPLE OF SELECTED MEDIUM SIZED CITIES

Abstract: The main aim of the paper is to discuss the role of individual transport in city logistics in the aspect of quality of life. The article is based on an empirical study. It presents the results of quantitative research based on a questionnaire survey, which was conducted in three medium sized cities in Poland among 1600 citizens. The main goal of the research was to receive information about the correlation between city logistics and the quality of life. The article presents only a narrow part of the survey research in the area of individual transport in terms of quality of life.

Keywords: individual transport, quality of life, congestion, city logistics.

1. Introduction

In the literature urban logistics is mainly associated with freight transport [1, 2, 3]. However, in recent time more and more scientists define urban logistics not only in relation to the flow of goods but also to the movement of people within the city [4–7]. The problem of congestion has been noticeable in large cities for a long time and slowly begins to concern the medium sized cities. Over the past 20 years, the automotive industry has increased in some Polish cities by up to 100% [8]. Therefore, increasing congestion is caused not only by too many freight cars but also by passenger cars. The increasing standard of life as well as technological developments made car ownership easy to access, which tells about a level of living. In addition, the structure of the spatial development of cities has changed. Suburbia are formed outside of the city and thus increases the distance people must travel daily from home to work. All these changes affect the urban logistics which plays an increasingly important role in the city.

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2. Individual transport and the quality of life as important factors, which influence on city logistics

City logistics has been playing important role in urban area. There are many different definitions of city logistics in the literature [9–17]. One of them says that city logistics “focuses on planning, coordinating and controlling processes taking place within the boundary of a given urban area and is related to physical movement of goods (i.e. raw materials, semi-products, goods and waste, etc.), people and information in a manner that will optimise costs, minimise congestion and improve quality of life”¹.

The main role of city logistics is to optimise city’s logistics system (Figure 1), which is composed of the following functional subsystems [18]:

- 1) transport of both material goods and provision of utilities;
- 2) transport and storage of municipal waste;
- 3) collective and individual transport;
- 4) storage of material goods and industrial and commercial zones and in city’s commercial chains;
- 5) controlling flows of material goods and humans².

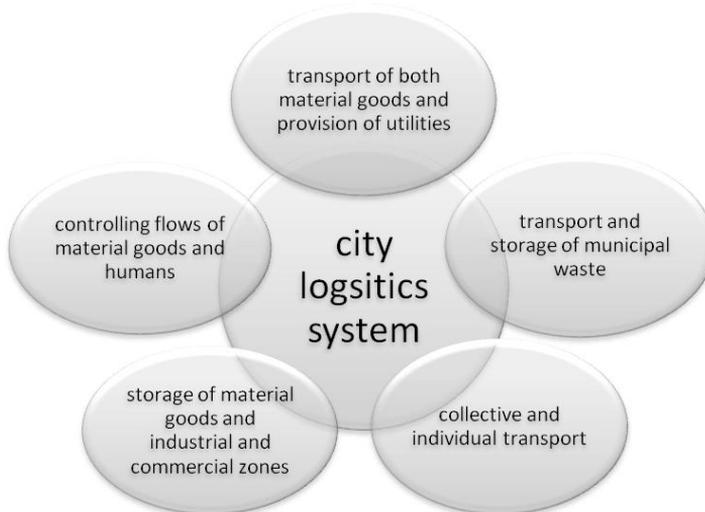


Fig. 1. Functional subsystems of city logistics system [19]

¹ Witkowski J., Kiba-Janiak M., Correlation Between City Logistics and Quality of life as an Assumption for a Referential Model, in: Proceedings of the 7th International Conference on City Logistics (E. Taniguchi, R.G. Thompson, eds.), 7–9 June 2011, Mallorca, Spain, p. 641.

² Szoltysek J., 2007, Podstawy logistyki miejskiej, AE of Katowice, Katowice, 41. W Kiba-Janiak M., Cheba K., 2010, City Logistics versus Quality of Life in The Area of Public Transport After an Example of a Medium-Sized City, International Logistics and Supply Chain Congress 2010, Logistics Association Publication No: 9, Istanbul, Turkey, 2010, pp. 279–286.

According to E. Taniguchii there are three aims, which should be achieved by city logistics system: sustainability, mobility and liveability [19] (Figure 2).

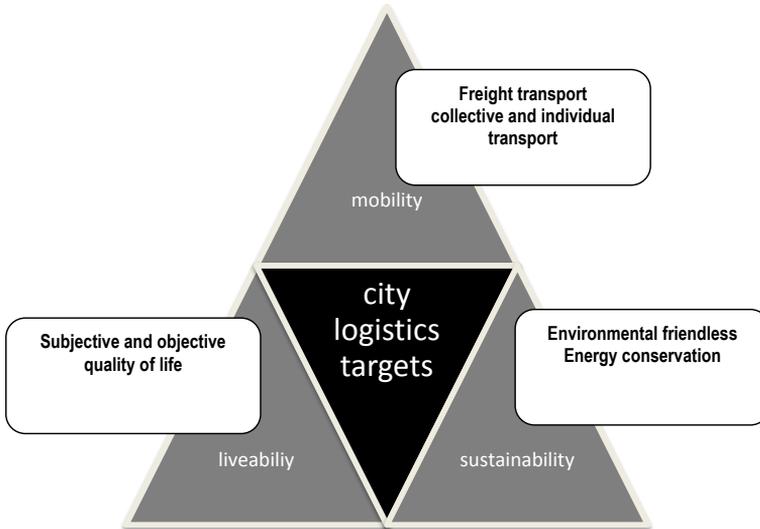


Fig. 2. Functional subsystems of city logistics system [20]

Sustainable development is essential while applying city logistics solutions. Freight but also passenger transport cause noise, air pollutions and vibrations. Therefore, logistics city planning should be done in a harmonised and friendly environment [19].

Liveability is defined as "the well-being of a community and represents the characteristics that make a place where people want to live now and in the future" [20].

"Mobility is defined as easy of movement" [21, 22]. There are two ways of movement people within the city: by collective or individual transport.

Collective and individual transport is one of the functional subsystems in the city's logistics system. Needs to move around the city have a lot of primary sources related to the necessity to reach work, school, a shop or other institutions.

Collective transport is a "regular transport performed at the request of local government transport organizer only within a single municipality, two or more municipalities, by agreement among the municipalities forming the communal inter-relationship"

Individual transportation is contrasted with collective public transport and is characterized by the specific terms of communication and the lack of regularity. Individual transport includes transport means such as a bike, a car, a motorcycle. Table 1 shows the differences between individual and collective transport.

Table 1. *Differences between individual and public transport*

Description	Public transport	Individual transport
Source of funding	Dually: city and users of this kind of transport	Users of this type of transport means
Regularity of transportation	High regularity of transportation	Lack or rare regularity of transportation
Transport conditions	A large number of people using one means of transport	A small number of people using the same means of transport
Costs	Low cost of movement for one passenger	High costs of movement
Privacy	Lack of privacy	High privacy
House to house movement (flexibility of movement)	Moving along designated and fixed routes	You can reach any place

Individual transport in Poland became important only after 1990 (motorization rate in 1960 was 4 in 1970, 15, 1980, 67, 1990, 138, 261 in 2000 and in 2005 323 passenger cars / per 1000 inhabitants) [8]. In 2007 the rate of motorization in cities of more than 300 000 was more than 400 and in small towns from 25 to 50 000 over 500. The lowest rate of motorization occurs in medium sized cities of 50 thousand to 200 thousand inhabitants [23].

The evolution of the automobile rate is associated both with the development of civilization and the increase in quality of life. On one hand, income growth contributes to increasing rate of motorization but on the other hand, the rise in the number of cars in the city contributes to growing congestion.

According to E. Taniguchii city logistics, through innovative solutions contributes to the increase of the quality of life in urban areas [9].

Quality of life is strongly connected with livability. In literature you can find many references that deal with the concept of quality of life [24–30]. Some of these definitions are related only to the living conditions (objective of quality of life) and some to the happiness (subjective quality of life). At the beginning of 2000th Fahey, Nolan and Whelan developed the conception of quality of life by including both objective and subjective dimensions [28].

Owning a car is the result of wealthy society and the means to move faster. Especially, small and medium sized cities do not feel burdensome congestion resulting from excessive car traffic, which takes place in cities of large size. Therefore, in small and medium sized cities, a car makes moving within the city faster and meets the needs related to work, free time, etc. Figure 3 shows the relationship between the individual transport (located in the city logistics) and selected areas of quality of life.

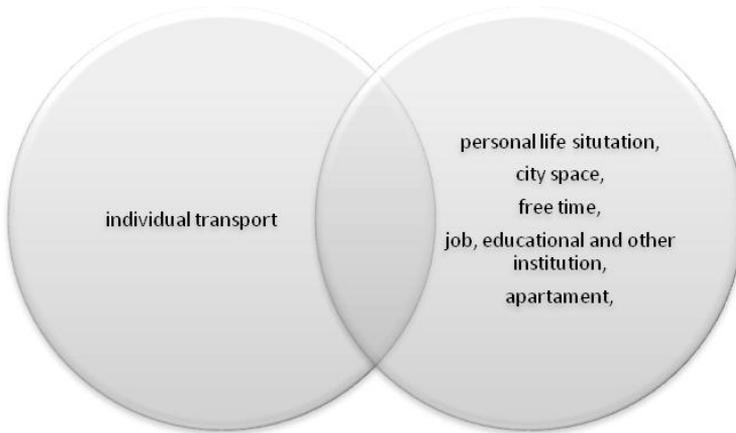


Fig. 3. Correlation between individual transport and chosen aspects of quality of life

Mobility of inhabitants and quality of life are two very important objectives of urban logistics. Although traffic causes congestion in cities, a number of people who move in cars continues to rise. In medium sized cities the problem of traffic slow-down, resulting from too many vehicles on the road, is not yet visible. Despite this, local authorities should take measures to prevent the spreading of congestion in the city.

3. Survey results presentation

The survey was the first part of the second step of the research conducted between January and March 2011 in three medium sized cities:

- Gorzów Wielkopolski – among 600 residents
- Zielona Góra – 600 residents, and
- Jelenia Góra – 400 residents.

The sample was a stratified quota sample selected with the following criteria:

- gender (male, female);
- age (up to 35, 35–60, 60 plus);

The survey research provide information about correlation between city logistics and quality of life and also assess these both aspects. For the purpose of this paper authors have organised only selected answers connected to the individual transport and quality of life.

In a questionnaire the servqual method has been used. This is a method of examining the quality of services, it has been created according to TQM guidelines. The point of this method is to compare the client's expectations to the service perceptions [31].

During the survey, respondents were asked to list ten categories in order of importance affecting their quality of life (Table 2). Studies show that the respondents of the three surveyed cities indicated the same first three positions. At first, the most important one was: finding a good job, the second was earning money and the third was living conditions. All three of these criteria are associated with the satisfaction of economic needs of residents. According to respondents in medium sized cities moving around the city is not important compared to other criteria affecting the quality of life. In all surveyed cities this criterion was on 9th place (before convenient shopping).

Table 2. Ranking the most important factors determining the quality of life

Gorzów Wlkp.	Zielona Góra	Jelenia Góra
Finding a good job	Finding a good job	Finding a good job
Making money	Making money	Making money
Housing conditions	Housing conditions	Housing conditions
Safe environment	Safe environment	Accessibility to health service
Education	Education	Safe environment
Accessibility to health service	Accessibility to health service	Education
Leisure	Clean environment	Clean environment
Clean environment	Leisure	Leisure
Moving around the city	Moving around the city	Moving around the city
Convenient shopping	Convenient shopping	Convenient shopping

The results of the survey confirm the statistics, which indicates the constant increase in the automotive industry. In all surveyed cities about 50% of respondents moved through the city by car. Public transport among respondents is used in Gorzów Wlkp. by 24.2%, in Zielona Góra by 22.6% in Jelenia Góra only by 16.3% (Table 3).

Table 3. Daily using various types of transport

Transportation means	Gorzów Wlkp.	Zielona Góra	Jelenia Góra
Public transport	24,20%	22,60%	16,30%
A car	49,20%	51,70%	46,30%
A motorcycle	0,20%	1,40%	0%
A bicycle	0,50%	1,70%	2,60%

Research shows that the biggest amount of respondents (53,7% in Gorzów Wielkopolski, 47,9% in Zielona Góra and 41,7% in Jelenia Góra) go straight to work.

In Gorzów Wielkopolski and Jelenia Góra every fourth respondent sometimes goes straight and sometimes does something on the way to work. Less than 10% of respondents usually take care of other things on their way to work. In Jelenia Góra and Zielona Góra over 20% of respondents do not have to move to work while in Gorzów Wielkopolski in similar situation are only 10% of respondents (Figure 4).

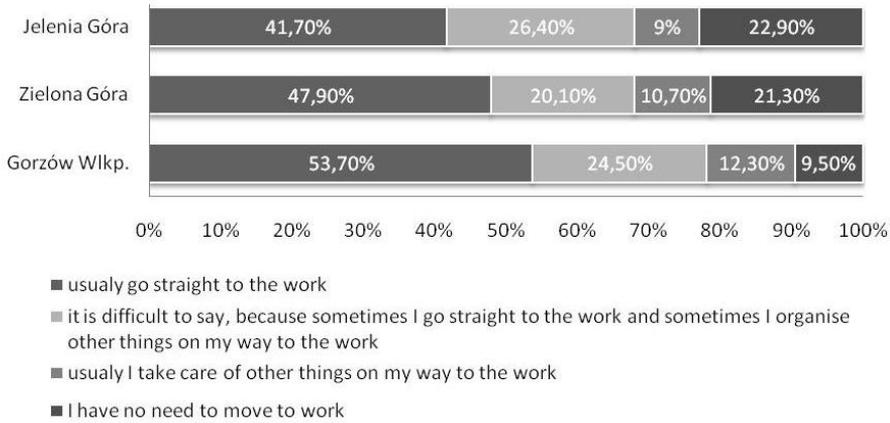


Fig. 4. The most common way to work

The figure 5 presents opinion of respondents about the time passing using the city public transport in relation to traveling by car. In all three towns over 80% of respondents have opinions that traveling within the city by public transport is slower than traveling by car.

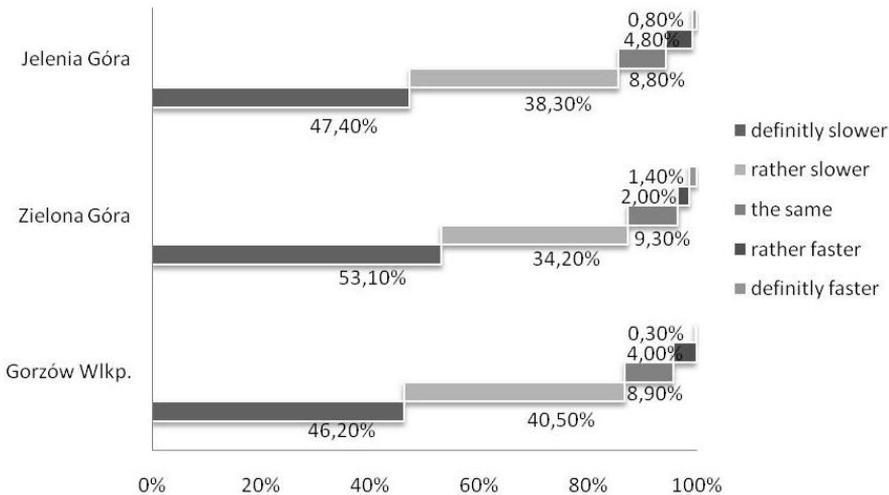


Fig. 5. Opinion of respondents about the time passing by the city public transport in relation to travel by car

Although traveling by car is the most popular way of movement within the city this form of transport is associated with many inconveniences. Every second respondent has an opinion that difficulty in finding parking is the biggest inconvenience while traveling by car in medium sized cities. Similar number of respondents in Jelenia Góra and about 40% of respondents in Gorzów Wielkopolski and Zielona Góra think that this inconvenience is also caused by the uncertainty of the length of the journey. Only 10% to 15% of respondents have opinions that the risk of theft and car damage is major inconvenience of traveling by car (Table 4).

Table 4. Respondents' opinions about the major inconvenience of travelling by car

Specification	Gorzów Wlkp.	Zielona Góra	Jelenia Góra
1. Difficulty in finding parking	51.1%	47,5%	54,7%
2. The uncertainty of the length of the journey	37.8%	40,8%	48,6%
3. Overcharge for parking	29.3%	30,6%	33,8%
4. Too expensive form of travel	23.1%	24,1%	36,0%
5. There is no inconvenience of traveling by car	15.6%	12,5%	10,3%
6. The risk of theft and damage of the car	11.5%	14,4%	15,1%

Table 5 presents average assessments of relative and absolute quality gaps according to individual transport.

Table 5. Average assessments and preferences for qualities of individual transport on a 1 to 5 scale

Quality	Jelenia Góra		Zielona Góra		Gorzów Wlkp.	
	Relative quality gap	Absolute quality gap	Relative quality gap	Absolute quality gap	Relative quality gap	Absolute quality gap
1. Road quality	-2,48	-2,87	-2,01	-2,53	-2,26	-3,16
2. Travel time through the city	-1,59	-2,27	-1,36	-2,11	-1,41	-2,38
3. Road signs	-0,83	-1,82	-1,03	-1,87	-0,96	-2,02
4. Detours for trucks	-1,88	-2,68	-1,34	-2,2	-1,27	-2,35
5. Number of parking places	-2,03	-2,67	-1,72	-2,44	-1,87	-2,78
6. Quality of parking places	-1,49	-2,48	-1,27	-2,25	-1,37	-2,54
7. Convenient opportunity to charge for parking	-1,02	-2,17	-0,99	-2,1	-1,15	-2,29
8. Low prices for parking tickets	-1,88	-2,63	-1,44	-2,35	-1,42	-2,56
9. Convenient opportunity to regulate fees for exceeding the parking time	-1,76	-2,75	-1,3	-2,43	-1,37	-2,58

A relative quality gap is calculated as a remainder of assessments and real preferences as given by the respondents (relative quality gap equals the mean of sum of (n_i responder assessment minus n_i responder preferences)), whereas an absolute gap

is a remainder of real assessments and the maximal possible and ideal expectations from a given service as given by the respondents (absolute quality gap equals the mean of sum of (n_i responder assessment minus maximal preference)) [7].

In analysed cities the widest quality gaps, both relative and absolute, are showed up in road quality, number and quality of parking places, detours for trucks and low prices for parking tickets.

According to most respondents solutions such as the ban on the movement for trucks or the restricted hours to enter the city center, night-time delivery organisation or preferences for public transportation such as bus-lanes would improve considerably the quality of life in the area of city logistics (Table 6).

Table 6. Respondents' opinion about the solutions that could improve the quality of life in the area of city logistics

Specification	Gorzów Wlkp.	Zielona Góra	Jelenia Góra
1. Preference for public transport such as bus-lanes	65.0%	75,90%	78,50%
2. The introduction of entry fee to the city center	15.5%	18,90%	44,40%
3. Restrictions on the movement of vehicles in the city center (during peak hours)	30.2%	25,30%	45,40%
4. Prohibition on the movement of trucks through the city centre	74.7%	75,10%	81,50%
5. Prohibition on the movement of all vehicles through the city center	13.6%	15,50%	59,30%
6. Restrictions for heavy goods vehicles (e.g., resticted hours to enter the city centre)	75.5%	73,90%	73,50%
7. Night delivery organisation	71.5%	66,30%	61,40%

Research shows that around 75% of those surveyed are satisfied with living in their city. Only about 10% of people in Zielona Gora and Gorzow Wielkopolski and 15% of people in Jelenia Gora look for opportunities to move. The highest overall assessment of quality of life was given by inhabitants of Zielona Góra – 3.6, then by the inhabitants of Jelenia Góra – 3.4 and at the end by the inhabitants of Gorzow Wielkopolski – 3.2 (Figure 6).

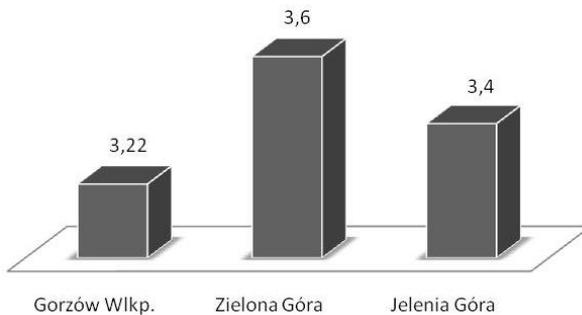


Fig. 6. The main assessment of quality of life in analysed cities

4. Conclusion

Individual transport is becoming increasingly popular way of movement in medium sized and small cities. Although respondents negatively estimated the quality of roads in the cities studied, still about 50% of respondents prefer to move around the city by car. It is due to the fact that in the medium sized cities traveling time by car in comparison to public transport is much shorter. Moreover, some people do other things on their way to work or travel with extra baggage (eg laptop). According to the respondents the biggest problem while moving around the city by car is, in addition to poor quality of roads, the uncertainty of the length of the journey, an insufficient number of parking spaces in the city and too high fees for parking.

According to about 75% of respondents smooth movement and thus the quality of life in cities could improve the ban on entry of trucks into the city center or assign vehicles entering the city center hours. On the other hand, respondents are not willing to relieve the center of motor vehicles. Only about 15% of respondents in Zielona Gora and Gorzow Wielkopolski believe that all cars should be banned from the city center. In case of Jelenia Gora the same opinion is shared by almost 60% of surveyed people. This is due perhaps to the fact that in this city is already limited access to the city center.

The European Commission in the development of 'White Paper' set ambitious objectives for city logistics. Namely, by 2030, a number of cars powered by conventional engine (hybrid engine) should be reduced by half, and by 2050 they should be completely eliminated. By 2030 logistics should be eliminated of CO₂ [32–33].

The objectives set by the European Commission show the enormous role of Government in the development of urban logistics, taking into account quality of life.

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