




“Problems of collective transport management – obstacles for the mobility of elderly and mobility-impaired”

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ARTICLE INFO	Irena Szewczyk (2020). Problems of collective transport management – obstacles for the mobility of elderly and mobility-impaired. <i>Problems and Perspectives in Management</i> , 18(4), 351-363. doi: 10.21511/ppm.18(4).2020.28
DOI	http://dx.doi.org/10.21511/ppm.18(4).2020.28
RELEASED ON	Thursday, 17 December 2020
RECEIVED ON	Friday, 02 October 2020
ACCEPTED ON	Tuesday, 01 December 2020
LICENSE	 This work is licensed under a Creative Commons Attribution 4.0 International License
JOURNAL	"Problems and Perspectives in Management"
ISSN PRINT	1727-7051
ISSN ONLINE	1810-5467
PUBLISHER	LLC “Consulting Publishing Company “Business Perspectives”
FOUNDER	LLC “Consulting Publishing Company “Business Perspectives”



NUMBER OF REFERENCES

37



NUMBER OF FIGURES

0



NUMBER OF TABLES

3

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BUSINESS PERSPECTIVES



LLC "CPC "Business Perspectives"
Hryhorii Skovoroda lane, 10,
Sumy, 40022, Ukraine
www.businessperspectives.org

Received on: 2nd of October, 2020Accepted on: 1st of December, 2020Published on: 17th of December, 2020

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PROBLEMS OF COLLECTIVE TRANSPORT MANAGEMENT – OBSTACLES FOR THE MOBILITY OF ELDERLY AND MOBILITY-IMPAIRED

Abstract

The key assumption of public transport is the overall accessibility for all its users. Lack of adjustments or only partial adjustments of the touristic transport infrastructure to the needs of elderly and disabled persons constitutes a barrier for their free mobility. The study aims to formalize measures to improve public transport activities by identifying the problems of the disabled and the elderly while traveling. The article presents an assessment of the current state and recognizing the most important problems of the physically disabled and elderly persons in the mobility in the city using public transport.

The research part of the article attempts to assess the availability of solutions in public transport for the physically disabled and elderly persons. For practical simplification, the article focuses on the mass transport implemented by the only possible means of this type of transport for the research is a bus.

In line with the predefined criterion, one city from the region of Bielsko-Biala was included into the research – city Szczyrk. In the article, the diagnostic survey was used as the best research method. The basic technique for collecting the empirical data was the open participating observation using the observation sheet. The basic research was complemented by the direct survey of disabled persons with various levels of disabilities to achieve intended results.

The research concluded that the mobility of disabled persons in the transport processes was assessed positively despite multiple difficulties and obstacles caused by their limited mobility and the lack of transport infrastructure adjustments (bus stops or information systems).

Keywords

physically disabled and elderly person, transport system, mobility

JEL Classification

I38, R40, J14

INTRODUCTION

European Consumers Centre Poland (ECC) notes that free movement and traveling through Europe becomes an everyday habit for a growing number of people. However, according to the data of the European Commission, every fifth European struggles while moving with public transport. The struggles result from advanced age, level of disability, or overall state of health. Access to healthcare, education, work, and other services (e.g., shopping centers) for people living and working in rural areas is a key issue worldwide (Velaga et al., 2012).

Carriers and the tourist infrastructure managers are obliged to implement and observe the rules of equal access to the services. In practice, the accessibility of the particular elements of the system of the public transport is regulated by multiple regulations and acts of various level of details, creating the duties and obligations to the carriers of the



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Conflict of interest statement:

Author(s) reported no conflict of interest

public transport, ensuring that the rights of the passengers with disability and the elderly in transport are a prerequisite for their full social integration, and limiting the access to the system of the public transport generates the biggest social exclusion, preventing the normal functioning.

1. LITERATURE REVIEW

According to the estimations of WHO, in 1970, the disabled persons constituted ca. 10% of the world population (Kawwa, 2016). Statistical data confirm that disabled people constitute a large proportion of society (Szewczyk, 2015). Currently, it is estimated that over a billion persons live with some disability. This corresponds to about 15% of the world's population.

Disability is one of the most important problems of the contemporary world. This results from the fact that the phenomenon is common and frequent. The number of persons aged 15 years or more and who have functional problems is between 110 million (2.2%) and 190 million (3.8%).

In most OECD countries, females have higher rates of disability than males (Disabled World, n.d.). Notwithstanding the indications used, the clear trend of the growing number of disabled is visible in Poland and Europe, which derives primarily from the civilization changes: the progress of the knowledge and medical technologies, extending human lifespan due to the implementation of the mechanisms of healthcare management and the overall welfare, as well as due to the cultural changes related to the healthcare, physical, and intellectual fitness and the social role templates (Gąciarz & Rudnicki, 2014).

Disability is a long-term state in which certain limitations in the correct functioning of a person occur caused by the lower efficiency of physical or intellectual functions (Kola, 2010).

Everyone who experiences a long-term limitation in the correct functioning can be considered a disabled person. It can be caused by a lower level of physiological, mental, or intellectual fitness (Pituła, 2016).

The limitations of these three areas of the body can be divided by the following criteria of disabilities: partial or complete, temporary or permanent, ac-

quired or inherited, aggressive or mild, progressive or stable (Barnes & Mercer, 2008). According to the Act of the European Parliament and the Council, the disabled person is everybody whose physical fitness when using the means of transportation is limited as a result of any physical disability (sensory or motor, permanent or temporary), intellectual disability, or any other type of the disability or due to the age and whose situation requires the proper attention and adjustment of the services allowed to all the passengers to his individual specific needs (Act of the European Parliament and the Council (EU) nr 181/2011, art.3, j). People with physical disabilities are people with a damaged musculoskeletal system and people with chronic diseases of internal organs. In Poland, they constitute almost half of the population of disabled people (Paszowska, 2019).

In the literature, the most frequently used definition of disability is one of the World Humanitarian Organisation (WHO). According to WHO, a disability is a multidimensional phenomenon resulting from mutual interactions between people and their physical and social environment and the result of the barriers encountered in the physical and social environment (Trębicka-Postrzygacz, 2017). The disability is a concept which evaluates and results from the interactions between the persons with dysfunctions and the barriers resulting from the people's approach to the environment, which hamper the full and efficient participation of these persons in the social life based on the rules of equality with others (Jankowska, 2012). From the definition of WHO, it can be concluded that the concept of the disabled person has a multiprofile nature. It encompasses the variety of the criteria, i.e., physical, social, psychological, educational, professional, and cultural and the objective, which is served by the particular approach (Trębicka-Postrzygacz, 2017).

Aging is a common and natural process in life. This is the phenomenon of the biological nature and unavoidable, lasting, differentiated, and multidimensional process, which, on the one hand,

depends on the human being; on the other hand, it depends on many factors including social, economic, biological, psychological, ecological, historical, and cultural ones. The borders of the elderly are fuzzy, and the very process of aging of the body progresses in stages. The first stage is social aging, followed by physical aging. The process depends on the lifestyle and the conditions of living, gender, and place of living. The progressing economy and social changes, the quick technical and IT progress improving well-being, and developing medicine boost the human lifespan. The result of this is the quicker growth of the persons in the elderly age than the growth of the number of newborns. An unavoidable process of aging is the stage of senility. Aging means a certain process, and it has a dynamic nature, while senility is static (Porzych et al., 2004).

Currently, 3 phases of senility are distinguished (Szweda-Lewandowska, 2012):

- young old – persons in the age of 60/65-74 – people who are fully fit physically and mentally;
- old old – persons between 75 and 84 who require support in chosen everyday activities like shopping, housekeeping, laundry;
- the oldest old – over 85 (in Poland 75-80) who require continuous support in most their activities.

In 2010, the participation of persons from 65 and more in the European population was 14.4%. In 2060, this group is expected to constitute 30% of the European population (Labus, 2014). Similar prognosis also refers to Northern and Southern Americas and Asia. Particularly, in many Asian countries, it is expected that the group of elderly over 60 will increase as a percent of the population, and it will exceed 30% (Raczyńska-Buława, 2017).

As of today, in Poland, there are 112 elderly for every 100 young persons. The observed demography development indicates that situation in Poland is still difficult and that no changes are indicating the stable demographic growth in the closest prospects (GUS, 2019). Oppositely, the changes in the age structure show that the systematic decrease of

the young group in the reproductive age will be seen with the simultaneous growth of elderly requiring the support and care (Adamczyk, 2017).

An important issue related to the disability of the elderly is the functional fitness in the basic scope (functioning at home) and more complex activities (functioning in the environment). This translated directly to the independence and self-efficiency of an elderly person. The independence encompasses activities related to moving, putting the clothes on, eating and preparing the meals, using the transport, medical visits, etc. A very significant issue is the accessibility of public space. The requirements for the accessibility of the public space are discussed in many international documents and particularly in the Convention on the Rights of the Persons with Disabilities adopted by the United Nations General Assembly on 13th of December 2006 (UN Resolution A/RES/61/06), ratified by Poland on 6th of September 2012. Article 9 of the Convention focusing on the accessibility determines the activities, which should be undertaken by the member countries in the scope of the availability of the physical environment, transport, information and communication including the information and communication technologies (ICT) and all the services offered to the entire society. The activities should include, among others, the elimination of the barriers and obstacles in the access to the buildings, roads, transport, etc. (UN Resolution A/RES/61/06, art. 9). The factors that contribute to travel characterize the propensity to travel. These include high level of personal income, proximity of tourist facilities, availability of tourist resources, low travel costs, favorable exchange rate, and attractiveness of a tourist destination (Danylyshyn et al., 2019).

The accessibility is the effect of the universal design rules, i.e., the philosophy of the design of products and environment in the way that they can be by everybody in the widest possible meaning without additional adaptation or special design. Applying these rules efficiently supports eliminating the discrimination of any specific group of public transport passengers, including disabled persons (Dębiec, 2013).

Such planning is recommended to secure accessibility for the elderly and all persons with limited

mobility and all disabled persons. The sole adjustment of the infrastructure is not a sufficient solution. It is also crucial to train the employees and organize the help and all support needed.

In 1997, a group of scientists from the State University of North Carolina developed seven principles of universal product and environment design (Centre for Excellence in Universal Design (CEUD), n.d.):

- equitable use;
- flexibility in use;
- simplicity and intuitiveness;
- perceptible information;
- tolerance for error;
- low physical effort;
- size and space for approach and use.

National regulations of the rights of passengers with disabilities are, most frequently, the effect of the necessity of compliance with the standards and the solutions of the passenger services set by the European Union. It should be stressed that in this field, many recommendations developed by international organizations such as the United Nations or the Conference of European Ministers of Transport (CEMT), organizations of persons with disabilities. However, only the European regulator introduced the obligation to respect the regulations of disabled passengers in the transportation sector in Europe (Bergel, 2014). The next generation of elderly will be different from the current generation. These differences are due to changes in the environment where they live, their own needs, skills, and behaviors (Aguar & Macário, 2017). It should also be noticed that disabled persons become more and more mobile. The movement related to the active rehabilitation, education, and determination of interested parties and individual persons has stimulated the growing interest of elderly and disabled people in participation in all areas of life, starting from learning and work to traveling for leisure. The perception of the rights of people with disabilities in the context of human rights changed strongly. This means that society recognized the equal rights of disabled persons and persons fully fit.

Problems and tasks of public transport in urbanized areas are the topic of many researches and an-

alytic works worldwide because the urban transport industry is strategically important for the economic development of the country and its regions (Bashynska et al., 2020).

The field of transport for a bigger number of passengers on short distant routes (e.g., cities, counties, other local areas like Polish gmina, etc.) lacks clear terminology. Existing definitions are diverse, inconsistent, often confusing, and lacking precision. The activities are often called mass transport, public transport, urban transport, local transport, passenger, or public transport. Notwithstanding, the word 'communications' is often used synonymously to 'transport' (Churski, 2010).

Transport is a set of activities related to moving persons and material goods using adequate means (Grinke, 2012). In Polish, communications, in turn, constitute a merger of transport and connectivity (Churski, 2010). In English, the meaning of the word is also different – these are the means of traveling or transporting goods, such as roads or railways, and frequently is defined as an (existing) system covering transport, transport means, and related operations.

Many researchers consider transport the same as communication conveying that the space fulfills the same functions. Thus, concerning the transportation of people, the concept of transport and communication can be used synonymously because by narrowing the object to the persons, the meaning of the communication is narrowed (Churski, 2010).

The transport is considered a service, and the delivery of the transport service requires an adequate transport infrastructure, transport means, people, and the system of established rules, which jointly create a transport system (Przybylska, 2011), regarded as all technical, organizational, economic, and legal issues (Kurowski, 2017).

The classification of transport can take various forms depending on the chosen criterion. The popular criterion is the environment of task implementation; thus, the transport is divided into the road transport, air transport, water transport (Kacperczyk, 2009), is related to the means of transportation: railway transport, car transport, bus transport, tramway trans-

port, horse-drawn transport, pipeline transport, etc. (Dębski, 2006). Transport can also have an individual or mass nature. Considering the availability to the user, the transport is divided into public transport, branch transport, and individual transport (Rogalski & Popławski, 2013).

In each stage of life, the person needs a feeling of independence, which also encompasses maintaining mobility and assuring comfort. The need for communications results from the need to travel in a certain moment from the starting point to the end/destination point. The diagram of the dependence of transport elements has the shape of a closed ring, in which each element (information, way to a stop, waiting at a stop, getting on, traveling, getting off, and reaching the destination) determines the next one (Dębiec, 2012).

Public transport is an important factor in satisfying the communications needs of society. The act of public transport defines it as a commonly accessible regular convey of people performed by the carrier based on the confirmation of the application of the convey in the determined periods and on the predefined communication route or routes or communications network (Dz. U. z 2011 r. Nr 5, poz. 13 Art. 4, pkt 14). The more narrow and detailed concept are transfers of public use, which are also a part of public transport. They are based on the contracts between the operator (carrier, provider) and based on the conditions described in the contract, including the schedule of the transfers or the location of the stops. The most important difference between public transport and public transfers is the possibility of applying the regulatory discounts. In the transfers of public use, the organizer is the responsible body for setting the prices and defining the times of operating the transport (Słowikowska, 2017).

The percentage contribution of public transport in transfers shows big differentiation. The main reasons for such structure are (Sipa, 2014):

- wealth of the society (impact on the possibility to acquire the means of individual transport, e.g., car);
- available transport infrastructure, its density, quality, and safety;

- system of stimulus and incentives (encouragement for using these means of transport, which serve the city);
- spatial environment and conditions (e.g., lack of parking spaces due to the small space for the traffic or short distances within the routes).

Gmina can be the organizer of the public transport in Poland (the lowest level of the Polish local administration), intermunicipal association, association of counties (powiats), voivodeship, or the minister for transport affairs or another adequate department, which is competent for operating the public transport in the given area (Dz. U. z 2011 r. Nr 5, poz. 13 Dział II, Rozdz. 1, Art. 7).

The transport can be provided by the operator of public transport and the carriers who meet the predefined requirements for delivery of the activities in the area of the transportation of people. The transport is then regulated by the following documents (Dz. U. z 2011 r. Nr 5, poz. 13 Dział I, Rozdz. 1, Art. 5, §2):

- contract of the delivery of the services in the field of public transport;
- confirmation of the application of the transfer;
- decision granting open access.

The organizer of public transport is responsible for planning, organizing, and managing public transport. The very organizing includes the complexity of tasks starting from the analysis for transfers in public transport to ticket distribution. Particularly significant activities are to guarantee the adequate conditions of functioning public transport, including (but not limited to) the standards for the stops, stations, changing stations, the rules of usage of the stops and stations, operating the integrated changing stations and the integrated system of tariffs and tickets for the passengers (Sipa, 2014). It covers the economic and management aspects of electric car production and operation and technical, environmental issues, etc. Today, electric transport includes passenger cars, city and intercity buses, trucks (Sotnyk et al., 2020). The organizer of public transport is also responsible for the periodic control and assessment of the opera-

tors and the carriers' services, encompassing the compliance with the rules of the operating public transport.

On 22nd of June 2013, an act dated on 10th of October 2012 amending the act – Transport Law and other acts (Polish Journal of Laws 2012, item 1448) came into effect, which introduced the Directive No. 2007/46/ES of the European Parliament and the Council dated on 5th of September 2007 into the Polish legal regulations; the said act stipulates the rules for the approval of motor vehicles, their trailers and of systems, components and separate technical units intended for these vehicles. As the result of the aforementioned implementation, the act stipulates the procedure for approving the indicated type of vehicles, including the vehicles intended for the transport of disabled people, in a harmonized way for all EU countries. Its major aim is to provide safety for passengers and appropriate technical conditions for people with limited possibility to use the vehicles, following the transport and social policy. On the one hand, it may be achieved thanks to technical solutions and, on the other hand, by combining them with appropriate local infrastructure.

According to the current laws, public transport shall consider the needs of all persons using the transport services. So far, many complex problems in the area of public transport have been solved thanks to the constructive elements improving the quality and comfort of the transport of elderly and disabled people.

The basic technical solutions include (Zabłocki et al., 2017):

- Use of low-floor buses, use of mechanically foldable ramps, extendable platform/steps, all with the anti-slippery surface.
- Internal lighting and external lighting designed properly, additional lighting mounted above the door on the external part of the vehicle enhances the level of safety when getting on/off the vehicle.
- Duplication of transmitted information, i.e., sending it through visual and auditory channels.
- Use of touch buttons with a noticeable change of position after pressing them.
- Contrast color combinations in places important for identifying spaces, appropriate (contrasting) marking of the edges of the extended platform, the edges of the entrance to the vehicle, and steps marked in contrasting colors, mounted in a way excluding the possibility of the bus to fall over.
- Use of sound signals both in vehicles and on bus stops, sound systems in the bus.
- Use of additional information (online schedules adapted to the needs of people with sight problems and blind).
- Rails and handles situated in the appropriate places, hip seat belts, support or backrest perpendicular to the longitudinal axis of the vehicle, rails or handles mounted on the side or wall of the vehicle, horizontal ceiling rails in the area with seats, situated symmetrically (on the right and left side of the vehicle).
- Ticket-puncher and ticket automatic machines adapted to the requirements of persons of various anthropometric dimensions.
- Sound and light information needs to be comprehensible for people with sensorial disabilities; external marking of vehicles should meet the needs of people with sight, perception, or strength disabilities.
- Places for baby carriages and people using the wheelchair should be equipped with safety seat belts and fastening devices, space for the wheelchairs needs to be free from any posts or ticket – punchers and large enough for the users of the wheelchairs to make a full rotation of them.
- Special seats (close to the doors) and space for people with limited possibility to move should be equipped additionally with a place for a guiding dog, elbow rests or handles situated between the seat and the aisle, optionally with additional handles, at least one special seat should have more space for legs. The

number of places for wheelchairs should be at least 1 in a standard vehicle and at least 2 in a larger bus.

- Facilities such as devices for a sideways tilt of the vehicle, which facilitate getting on/off the bus, arriving at the bus stop and leaving the bus stop.
- Approaching the door threshold to the edge of the walkway of retractable platforms.
- Bus floor with the anti-slippery surface, bump lines on the floor to enable the position identification.
- Shock absorbing handles.
- Hydraulic platforms enabling the transport of passengers in wheelchairs to be transported to the level of the vehicle floor placed high due to the luggage space.

2. HYPOTHESIS, DATA AND METHODOLOGY OF RESEARCH

The subject matter of the study refers to disabled people using public transport in Szczyrk. Concerning the subject mentioned above matter, the study aims to analyze the current situation and identify the essential problems of disabled people and elderly in moving around the city using public road transport.

The study is supposed to find the answer to the following question: are the public transport enterprises of the town of Szczyrk (Poland) adapted to the needs of disabled people and the elderly?

The following hypothesis has been taken about the enunciated study problems:

H₀: enterprises offering the collective transport services in the area of Szczyrk provide the appropriate transport services for disabled people and the elderly.

Hypothesis was tested using the Pearson Chi-squared test.

For simplification, the study analyzes only one means of transport existing in Szczyrk, mainly the bus.

The study particularly focuses on:

- identification of enterprises providing public transport services in the area of Szczyrk;
- identification of the significance of the solutions for the needs/collective transport for people with disabilities and elderly;
- identification of people with physical disabilities and the elderly, including the disabled using the public transport services in Szczyrk;
- determination of the availability of means of communication for disabled and elderly;
- determination of awareness of the significance of adopting the means of communication for the disabled and the elderly.

Three methods have been chosen for the study:

- 1) study of literature that aims to determine the level of knowledge in the determined scientific area being the basis for further research;
- 2) diagnostic survey method;
- 3) observation method, as the author has been using the collective transport services for many years, so she knows the technical background of the vehicles and is aware of possibilities to use them.

The study has been performed using the diagnostic survey method, questionnaire (survey), and personal interview.

The area of study was the town of Szczyrk. The spatial scope of work includes the area of Szczyrk, one of the most famous ski resorts in Poland, and its surroundings as the place of living of respondents who took part in the study.

The study, performed in June 2019 and August 2020, was conducted:

- on the enterprise with the license for transporting people in the area of research, Przedsiębiorstwo Komunikacji Samochodowej Bielsko-Biała S.A. (PKS S.A.);
- on 161 physically disabled elderly using the transport services on the route determined in the study.

The public transport in the town of Szczyrk is a public transport system carried out by PKS S.A., including direct bus connections on the main route Szczyrk – Bielsko-Biała, which goes through 4 localities.

The study involved 161 elderly people over 60 who were physically disabled, 76 of whom were men and 85 were women. The respondents were to assess public transport condition by answering questions about the frequency of using means of transport, purposes of use, assessment of the adaptation of bus stops, and the information system. The selection of the research sample was random and deliberate.

3. RESULTS AND DISCUSSION

The research confirmed the hypothesis assumed earlier in the study that companies offering public transport in the city of Szczyrk provide an appropriate transport service for people with physical disabilities and the elderly.

To check the distribution of answers to the questions in the questionnaire, a frequency analysis was performed for each of them. Of all responses to this question, the vast majority of respondents do not use 18% or use sporadically 44.1% the public transport provided by the Motor Transport Company (PKS) – 62.1% of all responses to this question. The number of people who travel often using the Motor Transport Company amounts to $n = 41$, which is 25.5%, and the number of people who travel every day using this means of transport is only $n = 20$ people (12.4%).

To examine the relationship between the gender of the respondents, and the answer to the question about the purposes of using public transport, sev-

eral Chi-squared tests of independence were performed. The analysis showed (Table 1) a statistically significant relationship between the gender of the respondents and whether they use the PKS public transport to travel to work – $\chi^2(1) = 5.77$; $p = 0.016$; $\phi = 0.19$. It turned out that in the group of women, none of them marked this answer. On the other hand, in the group of men, most of them did not mark it either, but five men answered in the affirmative, which indicates that 6.6% of all male respondents use the PKS buses to travel to work. On the other hand, there are no other statistically significant relationships between gender and the reasons for using PKS services.

The next stage of the analysis was focused on checking whether the age of respondents correlates to the frequency of using public transport services. In the case of the public transport services by the PKS enterprise, statistically significant relationships of moderate strength have been observed. The percentages presented in Table 2 show a negative linear relationship between age and frequency of using the PKS services, indicating that the older the elderly are, the less frequently they use this type of transport.

Then, the relationship between the age of the respondents and the reasons for not using PKS public transport was tested (Table 3). In case of the PKS transport services, statistically significant correlations between age and each of the marked reasons are observed except for a too high price of the monthly ticket; in this case, there no correlation has been observed. In other cases, it turns out that almost all causes are marked much more often in the 85+ age group compared to younger respondents from other age groups. Most of the respondents in the age between 60 and 74 have not marked any cause for not using the PKS transport services. The highest percentage in this group indicated too many changes as the reason for not using the PKS transport services, but this result is lower than in the other two age groups. All the described relationships are rather weak.

The Chi-squared test was also used to check if there is any correlation between the age of the respondents and the purpose of using public transport. In the case of the PKS public transport services, each purpose is significantly related to age. The strong-

Table 1. Cross-table presenting the number and percentage of answers “For what purposes do you use collective transport (PKS)?” depending on gender

Source: Developed by the author based on the data.

Reason	Answer	Unit	gender		χ^2	p	φ
			men	women			
Travel to work	Not marked	N	71	85	5.77	0.016	0.19
		%	93.4%	100.0%			
	Marked	N	5	0			
		%	6.6%	0.0%			
In general		N	76	85			
		%	100.0%	100.0%			
Personal matters	Not marked	N	40	55	2.42	0.12	0.12
		%	52.6%	64.7%			
	Marked	N	36	30			
		%	47.4%	35.3%			
In general		N	76	85			
		%	100.0%	100.0%			
Shopping	Not marked	N	52	62	0.4	0.529	0.05
		%	68.4%	72.9%			
	Marked	N	24	23			
		%	31.6%	27.1%			
In general		N	76	85			
		%	100.0%	100.0%			
Social gathering	Not marked	N	53	67	1.75	0.186	0.1
		%	69.7%	78.8%			
	Marked	N	23	18			
		%	30.3%	21.2%			
In general		N	76	85			
		%	100.0%	100.0%			
Health matters	Not marked	N	28	40	1.72	0.19	0.1
		%	36.8%	47.1%			
	Marked	N	48	45			
		%	63.2%	52.9%			
In general		N	76	85			
		%	100.0%	100.0%			
Tourism	Not marked	N	67	76	0.06	0.801	0.02
		%	88.2%	89.4%			
	Marked	N	9	9			
		%	11.8%	10.6%			
In general		N	76	85			
		%	100.0%	100.0%			

Table 2. Cross-table presenting the number and percentage of answers to the question “How often do you use collective transport?” depending on age

Source: Developed by the author based on the data.

Question	Frequency	Unit	AGE			c^2	p	V_c
			60-74	75-84	85+			
Frequency of using the collective transport	Does not use	N	10	4	15	89.47	< 0.001	0.53
		%	20.0%	6.3%	31.9%			
	Sporadically	N	5	35	31			
		%	10.0%	54.7%	66.0%			
	Often	N	15	25	1			
		%	30.0%	39.1%	2.1%			
	Every day	N	20	0	0			
		%	40.0%	0.0%	0.0%			
		N						
		%						

Table 3. The number and percentage of ticks of the answer “Why do you not use public transport?” depending on age

Source: Developed by the author based on the data.

Reason	Answer	Unit	AGE			χ^2	p	V_c
			60-74	75-84	85+			
Too high price of a single ticket	Not marked	N	41	38	16	23.04	< 0.001	0.38
		%	82.0%	59.4%	34.0%			
	Marked	N	9	26	31			
		%	18.0%	40.6%	66.0%			
Too high price of a monthly ticket	Not marked	N	42	52	32	4.17	0.125	0.16
		%	84.0%	81.3%	68.1%			
	Marked	N	8	12	15			
		%	16.0%	18.8%	31.9%			
Distance from the stop	Not marked	N	47	49	25	21.72	< 0.001	0.38
		%	94.0%	76.6%	53.2%			
	Marked	N	3	15	22			
		%	6.0%	23.4%	46.8%			
Lack of convenient time connections	Not marked	N	47	51	34	8.08	0.018	0.22
		%	94.0%	79.7%	72.3%			
	Marked	N	3	13	13			
		%	6.0%	20.3%	27.7%			
Too many changes	Not marked	N	38	30	13	23.15	< 0.001	0.38
		%	76.0%	46.9%	27.7%			
	Marked	N	12	34	34			
		%	24.0%	53.1%	72.3%			
Improperly adapted to the needs of physically disabled and elderly people	Not marked	N	48	59	35	12.42	0.002	0.28
		%	96.0%	92.2%	74.5%			
	Marked	N	2	5	12			
		%	4.0%	7.8%	25.5%			

est relationship has been observed about shopping. Compared to the group of respondents in the age of 75 or more, the respondents in the age between 60 and 74 travel much more often to do shopping, and the rest, older respondents, hardly or not at all. A similar tendency has been observed for other responses, which were most often selected by the youngest participants of the study.

The other two Chi-squared tests were to check if the respondents from three age groups differ significantly in terms of answers to the question about the overall assessment of the PKS services. In the case of the PKS services, moderately strong and statistically significant relationships are observed. The proportions of the responses allow the conclusion that age and assessment enter into a linear, negative relationship. The negative nature of this rectilinear relation shows that the older the respondents are, the worse they evaluate this form of transport.

The results are similar to the above ones also in the case of the evaluation of the adaptation of stops to the elderly and disabled. The respondents aged 60-74 more often than others assess this adjustment as very good and good. The respondents aged 75-84 more often assessed them as good or bad. In turn, the oldest respondents compared to other age groups, assess the adaptation of the stops as bad and very bad. These relationships are relatively strong.

In the last part of the statistical analysis, it was checked whether there was a significant relationship between age and the assessment of information placed at stops. Also, significant correlations have been observed between the age and the assessment of information connected with the PKS transport (yet of moderate strength). Similarly to the points described above, the dependence is that the frequency of appearing “bad” or “very bad” responses increases with age.

CONCLUSION

World forecasts inform about the rapid aging of societies in all developed countries and a steady increase in the global percentage of people with disabilities. According to statistical data, currently, in almost every country, about 10% of the population can be classified as disabled, of which 50-70% are disabled with a high degree of disability, making it difficult to function in various areas of life. This is the most diverse group – with different preferences, level of fitness, health conditions, and lifestyle. This is also the most prejudice-affected social group – usually neglected and marginalized. Transport is very important for social and integration reasons. Availability of transport services for the disabled means the increase of their life opportunities.

Various research shows that traveling through public transport causes many troubles, difficulties, and stress related to the need to travel for elderly people, and the use of means of public transport itself is almost impossible.

Current research performers on a group of 161 surveyed persons demonstrate that the means of public transport are practically suitable. The majority of surveyed – 96% (of the age group 60-74), 92.2% (of age group 75-84), and 74.5% (of age group 85+) pointed adequate adjustments to the needs of physically disabled and elderly people. Half of the surveyed persons of the age group 85+ pointed too big distance to the bus stop (the access routes) as a reason for not using public transport.

An additional barrier is the financial situation of people who receive retirement, pension, or disability benefits; these people are particularly exposed to social exclusion caused by too high transport fees. More than half of the surveyed group (66%) indicated a high price of the ticket. Some persons also pointed out too many changes during one journey.

The oldest respondents, different from other age groups, assess the adaptation of the stops as bad and very bad. This seems to be caused by the physical burdens of this group of people.

The bus stop infrastructure is mostly inadequate, with insufficient safety. In the research, the information at the bus stops was also assessed poorly, mainly lack of light and voice signals. Public transport consists not only of vehicles but also the passenger information. Hence, the lack of significant visual, tactile solutions, and auditory signals makes it difficult for disabled and elderly people to travel, destroying their self-confidence and limiting their independence.

The key recommendation for the transport management is to eliminate barriers to access to the public transport system by modernizing the vehicles to facilitate boarding and exiting from the vehicle, modernization of the stop infrastructure taking into account the routes to the stop but also by increasing the number of stops to ensure easy access from home or to the destination point.

The problem of ensuring the accessibility of public transport for the elderly and disabled is very complicated. Significantly limited access for certain groups of residents can be considered an injustice and a factor in increasing social inequalities. The best solution would be to provide the same access to the local public transport services to all inhabitants. This task is often very difficult, sometimes even impossible to implement due to numerous barriers, in particular economic and spatial ones.

Proper functioning of collective urban transport in cities is gaining importance concerning growing requirements to travelers, including people with physical disabilities and the elderly, whose needs related to the transport should be fulfilled.

AUTHOR CONTRIBUTIONS

Conceptualization: Irena Szewczyk.

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REFERENCES

- Adamczyk, M. (2017). Starzenie się społeczeństwa polskiego wyzwaniem dla zrównoważonego rozwoju. *Zeszyty Naukowe Politechniki Śląskiej, Organizacja i Zarządzanie*, 106, 105-114. <http://dx.doi.org/10.29119/1641-3466.2017.106.9>
- Aguiar, B., & Macário, R. (2017). The need for an elderly centred mobility policy. *Transportation Research Procedia*, 25. <https://doi.org/10.1016/j.trpro.2017.05.309>
- Barnes, C., & Mercer, G. (2008). *Niepełnosprawność*. Warszawa: Wydawnictwo SIC.
- Bashynska, I., Kovalova, O., Malovichko, O., & Shirobokova, O. (2020). Risk Management of Innovative Socially Significant Projects (On the Example of Urban Passenger Transport). *International Journal of Advanced Research in Engineering and Technology*, 11(4), 294-305. <https://doi.org/10.34218/IJAR-ET.11.4.2020.026>
- Bergel, I. (2014). Rola regulatora europejskiego i krajowego w zapewnieniu praw pasażerów niepełnosprawnych w transporcie. *Logistyka*, 2, 23-31. Retrieved from <http://yadda.icm.edu.pl/baztech/element/bwmeta1.element.baztech-138b9722-08cd-420a-85b7-2afd3fb6bf8c>
- Centre for Excellence in Universal Design (CEUD). (n.d.). *The 7 Principles*. Retrieved from <http://universaldesign.ie/what-is-universal-design/the-7-principles/the-7-principles.html>
- Churski, P. (2010). Pojęcie, funkcje i rozwój transportu publicznego. *Rozwój regionalny i polityka regionalna*, 13, 17-28. Retrieved from <https://pressto.amu.edu.pl/index.php/rpr/article/view/14442>
- Danylyshyn, B., Shynkaruk, L., Prokopenko, O., Bondarenko, S., Veres, K., & Kovalenko, L. (2019). Modelling Prediction of Consumer Demand in the Tourism and Hospitality Based on Time Series. *International Journal of Recent Technology and Engineering (IJRTE)*, 8(4). Retrieved from <https://www.ijrte.org/wp-content/uploads/papers/v8i4/D4338118419.pdf>
- Dębiec, M. (2012). Dostępność i bezpieczeństwo w transporcie publicznym osób o ograniczonej mobilności. *Komunikacja Publiczna*, 2, 3.
- Dębiec, M. (2013). *Dostępny transport kluczem do rehabilitacji społecznej i zawodowej osób niepełnosprawnych*. Retrieved from <http://www.moimioczami.pl/2013/01/dostepny-transport-kluczem-do-rehabilitacji-spoecznej-i-zawodowej-osob-niepelnosprawnych/>
- Dębski, D. (2006). *Ekonomika i organizacja przedsiębiorstw*. Warszawa: WSPiP.
- Disabled World. (n.d.). *Disability Statistics: Information, Charts, Graphs and Tables*. Retrieved from <https://www.disabled-world.com/disability/statistics/>
- Gąciarz, B., & Rudnicki, S. (2014). *Polscy niepełnosprawni. Od kompleksowej diagnozy do nowego modelu polityki społecznej*. Kraków: Wydawnictwo AGH.
- Grinke, L. (2012). *Systemy transportowe*. Akademia Techniczno-Humanistyczna, Bielsko-Biała.
- GUS. (2019). *Transport – wyniki działalności w 2018 roku*. Warszawa – Szczecin.
- Jankowska, M. (2012). Prawa osób niepełnosprawnych w międzynarodowych aktach prawnych. *Niepełnosprawność – zagadnienia, problemy, rozwiązania*, I(1). Retrieved from https://www.pfron.org.pl/fileadmin/files/0/78_03_Maria_Jankowska.pdf
- Kacperczyk, R. (2009). *Transport i spedycja* (cz. 1). Warszawa: Difin SA.
- Kawwa, J. (2016). Znaczenie rehabilitacji w zapobieganiu niepełnosprawności. *Niepełnosprawność – zagadnienia, problemy, rozwiązania*, II(19).
- Kola, A. M. (2010). O niepełnosprawności w podręcznikach do nauczania języka polskiego jako obcego. Zarzycka, G, and Rudziński, G, *Teksty i podteksty w nauczaniu języka polskiego jako obcego*, *Acta Universitatis Lodzensis*. Łódź: Wydawnictwo Uniwersytet Łódzki.
- Kurowski, J. (2017). System transportowy i jego uwarunkowania – aspekty gospodarczo-obronne. *Zeszyty Naukowe Akademii Sztuki Wojennej*, 2, 99. Retrieved from <http://yadda.icm.edu.pl/baztech/element/bwmeta1.element.baztech-13cc301d-866a-4c05-b-268-b21e3ae63005>
- Labus, A. (2014). Miasto przyjazne osobom starszym na przykładzie SANGERHAUSEN. In *Osoby starsze w przestrzeni życia społecznego* (pp. 194-219). Katowice: OIS.
- Paszkowska, M. (2019). Niepełnosprawni pacjenci w zakładzie rehabilitacji leczniczej. *Praktyczna Fizjoterapia i*

- Rehabilitacja*, 102. Retrieved from <https://www.praktycznafizjoterapia.pl/artykul/niepelnospawni-pacjenci-w-zakladzie-rehabilitacji-leczniczej>
23. Pitula, G. (2016). Komunikacja między osobami niepełnosprawnymi a służbami ratunkowymi z wykorzystaniem nowoczesnych technologii mobilnych. *Informatyka Ekonomiczna = Business Informatics*, 2(40). <https://doi.org/10.15611/ie.2016.2.04>
 24. Porzych, K., Kędziora-Kornatowska, K., Polak, A., & Porzych, M. (2004). Psychologiczne aspekty starzenia się i starości. *Gerontologia Polska*, 12(4). Retrieved from <https://www.kalendarzrolnikow.pl/3699/psychologiczne-aspekty-starzenia-sie>
 25. Przybylska, E. (2011). Analiza usługi transportowej w wybranym przedsiębiorstwie sektora TSL. *Zeszyty Naukowe Politechniki Śląskiej, Organizacja i Zarządzanie*, 56, 240-241. Retrieved from <http://yadda.icm.edu.pl/baztech/element/bwmeta1.element.baztech-article-BSL6-0014-0065>
 26. Raczyńska-Buława, E. (2017). Osoby starsze a miejski transport publiczny. Problemy i bariery mobilności. *Autobusy*, 1-2, 26-36. Retrieved from <http://yadda.icm.edu.pl/yadda/element/bwmeta1.element.baztech-fd7a4fe4-f8cc-4c13-8396-2965be3edd4c>
 27. Rogalski, W., & Popławski, S. (2013). Transport drogowy a rozwój gospodarczy w Polsce w latach 2003–2010. *Logistyka*, 2, 80. Retrieved from <http://yadda.icm.edu.pl/yadda/element/bwmeta1.element.baztech-fbb360b1-46de-431d-af95-05302ffc09c0>
 28. Rozporządzenie Parlamentu Europejskiego i Rady (UE) nr 181/2011, z dnia 16.02.2011 (art. 3, j) dotyczące praw pasażerów w transporcie autobusowym i autokarowym oraz zmieniające rozporządzenie (WE) nr 2006/2004. Retrieved from <https://www.infor.pl/akt-prawny/EOL.2011.055.0000010,metryka,rozporzadzenie-parlamentu-europejskiego-i-rady-ue-nr-1812011-dotyczace-praw-pasazerow-w-transportie-autobusowym-i-autokarowym-oraz-zmieniajace-rozporzadzenie-we-nr-20062004.html>
 29. Sipa, M. (2014). Publiczny transport zbiorowy na rynku usług transportowych – wybrane aspekty. *ZS WSH Zarządzanie*, 1, 187-197. Retrieved from <http://bazekon.icm.edu.pl/bazekon/element/bwmeta1.element.ekon-element-000171354285>
 30. Słowikowska, D. (2017). Cel i zakres ustawy o publicznym transporcie zbiorowym. In S. Rogaczewski, S. Zimniewicz, & A. Zimny (Eds.), *Transport i logistyka w przedsiębiorstwie, mieście i regionie. Wybrane zagadnienia* (pp. 31- 40). Katowice: Wydawnictwo Naukowe Sophia. Retrieved from https://depot.ceon.pl/bitstream/handle/123456789/13664/transport_logistyka_w_przedsiębiorstwie_mieście_regionie.pdf?sequence=1&isAllowed=y
 31. Sotnyk, I., Hulak, D., Yakushev, O., Yakusheva, O., Prokopenko, O. V., & Yevdokymov, A. (2020). Development of the US electric car market: Macroeconomic determinants and forecasts. *Polityka Energetyczna*, 23(3), 147-164. <https://doi.org/10.33223/epj/127921>
 32. Szewczyk, I. (2015). *Accessible Szczyrk hotels' features for disabled tourists*. Paper presented at 3rd International Scientific Conference Tourism in Southern and Eastern Europe 2015. University of Rijeka Faculty of Tourism and Hospitality Management, Opatija, Croatia.
 33. Szweda-Lewandowska, Z. (2012). Starzenie się i starość – ogólna charakterystyka. In P. Błędowski, B. Szatur-Jaworska, Z. Szweda-Lewandowska, & P. Kubicki (Eds.), *Raport na temat sytuacji osób starszych w Polsce* (pp. 15-32). Instytut Pracy i Spraw Socjalnych, Warszawa.
 34. Trębicka-Postrzygacz, B. (2017). O niepełnosprawności w definicjach i regulacjach prawnych w perspektywie inkluzji społecznej. *Student niepełnosprawny: szkice i rozprawy*, 17(10). Retrieved from <https://core.ac.uk/download/pdf/160238201.pdf>
 35. Ustawa z dnia 16 grudnia 2010 r. o publicznym transporcie zbiorowym, Dz. U. z 2011r. Nr 5, poz. 13.
 36. Velaga, N. R., Beecroft, M., Nelson, J., Corsar, D., & Edwards, P. (2012). Transport poverty meets the digital divide: accessibility and connectivity in rural communities. *Journal of Transport Geography*, 24, 102-112. <https://doi.org/10.1016/j.jtrangeo.2011.12.005>
 37. Zabłocki, M., Butlewski, M., & Sydor, M. (2017). Ergonomiczne rozwiązania techniczne dla osób z niepełnosprawnościami stosowane w transporcie zbiorowym. *Bezpieczeństwo Pracy. Nauka i Praktyka*, 10, 15-19. Retrieved from <http://yadda.icm.edu.pl/baztech/element/bwmeta1.element.baztech-27b9cbe4-97cc-433b-8ca7-60e08d1854ed>