

ICT IN MEETING THE TRANSPORT NEEDS OF SENIORS: AN OPPORTUNITY OR A THREAT?

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The article addresses the problems related to the transport needs of seniors, including the potential role of ICT solutions in meeting these needs. It discusses the use of ICT by seniors, as well as their needs and expectations regarding the transport system. An attempt to assign the examples of ICT solutions, that might be helpful in more effective fulfilment of the seniors' expectations concerning the desired features of transport system was undertaken. The influence of the implementation of ICT in transport system on the transport needs of seniors was discussed with the indication of the areas that will require taking additional measures and conducting further research.

Keywords: ICT, seniors, transport services, social exclusion, digital exclusion

1. Introduction

The ageing of the EU society presents numerous challenges both in social and economic terms. The needs, expectations and capacities of seniors are different from the expectations of other social groups [8]. Seniors are classified as a group that is particularly at risk of social and digital exclusion. Combating exclusion is an important task for different (public, private, EU, domestic and other) entities.

Proper fulfilment of the transport needs of elderly people reduces the risk of social exclusion and improves the perceived quality of life. At the same time, the increasing use of modern information and communications solutions (ICT) by entities providing transport services may cause an increased risk of digital exclusion.

The purpose of the article is to outline the problems of the influence of the increasing application of ICT in providing transport services on the fulfilment of the transport needs of elderly people. The article uses the analysis of literature and statistical data on the ageing of the society and the degree of ICT use by seniors in order to outline the problems of the transport needs of seniors and the potential influence of ICT application on their fulfilment in the further part of the paper.

The problems of old age in the context of economic, social and cultural changes are the effect of demographic processes which have been deepening over the years. The role of elderly people in the changing demography began to be considered more precisely in 2012, which was declared as the European Year of Active Ageing and Intergenerational Solidarity [16]. The ageing of society is regarded as a strategic problem faced by many countries, including Poland – the forecasted structure of Polish society has been presented in Table 1).

Table 1. Polish population forecast by biological age groups (in thousands and in per cent) for 2015-2050

Age	2015		2020		2030		2040		2050	
	thousand	%	thousand	%	thousand	%	thousand	%	thousand	%
Total	38,419	100.0	38,138	100.0	37,185	100.0	35,668	100.0	33,951	100.0
0-14	5,728	14.9	5,659	14.8	4,856	13.1	4,302	12.1	4,120	12.1
15-64	26,620	69.3	25,285	66.3	23,683	63.7	21,937	61.5	18,733	55.2
65+	6,071	15.8	7,194	18.9	8,646	23.3	9,429	26.4	11,097	32.7
80+	1,560	4.1	1,684	4.4	2,206	5.9	3,373	9.5	3,537	10.4

Source: own study based on GUS (Statistics Poland) data [5]

Initially, the problem of the ageing of the society concerned only the rural areas, which was connected with the migration of young individuals searching for better jobs and aiming to improve the quality of life. Nowadays, not only does it concern a majority of cities, but even the entire country, as shown by the data included in Table 2.

The presented forecasts indicate that a vast majority of people (almost twice as many) aged 65 or more will live in the cities rather than in the rural areas, both in the near future and in a longer perspective [5]. The transport needs of elderly people, regardless of the place of residence, are different than the needs of other age cohorts, and require taking appropriate measures in order to adjust the available transport needs and the entire broadly understood transport system, so as to include these needs.

Table 2. Polish population forecast of people aged 65 and more (in thousands and in per cent) in urban and rural areas for 2015-2050

Specification		2015		2020		2030		2040		2050	
		thousand	%	thousand	%	thousand	%	thousand	%	thousand	%
Cities	Total	23,129	100.0	22,716	100.0	21,618	100.0	20,234	100.0	18,826	100.0
	65+	3,936	17.0	4,719	20.8	5,477	25.3	5,691	28.1	6,533	34.7
	80+	966	4.2	1,076	4.7	1,482	6.9	2,207	10.9	2,143	11.4
Villages	Total	15,290	100.0	15,421	100.0	15,567	100.0	15,434	100.0	15,125	100.0
	65+	2,134	14.0	2,475	16.1	3,169	20.4	3,738	24.2	3,738	30.2
	80+	594	3.9	608	4.0	723	4.7	1,165	7.6	1,165	9.2

Source: own study based on GUS (Statistics Poland) data [5]

Seniors, or the group of people aged 65 or more (frequently described by age) is neither homogenous nor static. Firstly, there are big differences within the group due to features such as e.g. place of residence, family and material situation, education, health condition, gender, or even age itself. It is expected that a person who is about to turn 65 will have different expectations and needs than a person approaching the age of 80. Similarly, the other features will also translate to different capacities and expectations of seniors. Secondly, attention should be drawn to the changes occurring with reference to the entire group, resulting from the generation and life experiences, as well as work during social and technological transformations, such as the proliferation of computers and their use in various areas of life, Internet access or dissemination of mobile phones. Another important fact is the progress in medicine and general improvement of the quality of life, also in older age. The individuals who currently qualify for the age group 65+ begin to differ from the 'typical' image of a senior as a person who is not very active, uneducated or in a difficult financial situation. Such changes are increasingly noticeable and expected to increase further [6].

The transport needs of seniors and their expectations regarding a transport system will be described in the further part of the paper.

2. Transport needs and expectations of seniors regarding transport system

The transport expectations and needs are different from the needs of other age groups. The most typical example is the discontinuation of mandatory daily commuting when a person retires, which does not, however, necessarily have to reduce the seniors' demand for transport services, especially that one of the consequences of stopping professional work is the surplus of free time which seniors may want to

use in different ways. Seniors are increasingly willing to participate in cultural and integration events, educate themselves, as well as take part in sports and leisure events [13]. This results from the fact that they want to maintain social and physical activity for as long as possible and be independent, which has a significant impact on the quality of life perceived by them, as well as reduces the risk related to the sense of loneliness and social exclusion [3].

It shall also be remembered that the group of seniors is not homogenous, and the transport needs within this group will also be different, depending on the characteristics of particular seniors. For example, gender, age or family situation may have an influence on a senior's transport expectations and behaviours [14; 7]. Another factor that shall be taken into consideration when analysing the issues connected with the transport needs of seniors is the specific transport system in which these needs will be fulfilled, as well as the role that the senior will perform in this system (e.g. driver, private vehicle passenger, public transport passenger, pedestrian, etc.). The possibility of fulfilling the transport needs of seniors within the framework of a particular transport system depends on many objective factors and on the system perception by seniors.

Table 3. Transport system features expected by seniors

Feature	Description
Affordable	Use of transport system should be possible within the financial resources available to seniors.
Available	Seniors should be able to fulfil their transport needs by using the existing transport system.
Barrier-free	Transport system (both infrastructure and means of transport) should be adjusted to individual use (without or with minimum support of third parties) by seniors, taking into consideration potential difficulties (physical, sensory or cognitive) that are usually experienced by elderly people.
Comfortable	Use of transport system should not cause a sense of (physical or mental) discomfort, stress or anxiety in elderly people.
Comprehensible	Information about the opportunities offered within the framework of the transport system should be reported through different channels, so as to help seniors understand the transport offer that is available to them.
Efficient	Journey to a particular destination should be possible within reasonable time, taking into consideration the distance and means of transport used.
Friendly	Employees taking part in the process of providing transport services should be aware of the needs and limitations experienced by elderly people and should be available in the most appropriate manner (whether personally, or by telephone, e-mail or chat).
Reliable	Transport needs within the framework of a particular transport system should be carried out in a predictable manner and in line with the adopted assumptions (e.g. timetable, expected journey time), with the exception of fortuitous events that are difficult to predict (e.g. road accidents or very bad weather conditions).
Safe	The risk of accident during the use of transport system by a senior should be minimised.
Secure	Seniors should feel safe when using transport system – any threat from other transport system users, whether real or only felt by seniors, should be minimised.
Transparent	Seniors should be aware of the existence and possibility to use the available transport services, as well as conditions of their availability.

Source: based on [9]

The seniors' expectations regarding transport system concern a number of features and attributes describing the ease of using particular services, as well as their suitability and adjustment to the transport needs of seniors [9]. The desired transport system features and their description were included in Table 3.

When analysing the presented seniors' expectations regarding transport system, we may pay attention to the fact that a part of these expectations is not only limited to this particular group. The features such as availability, efficiency, and reliability are desired by everyone using a transport system, regardless of age. However, a majority of other features are more significant from the point of view of seniors, especially if the transport system is to guarantee their independence and higher social activity by ensuring the fulfilment of their transport needs.

Taking into consideration the large significance attributed to ICT solutions as a factor having a potentially big impact on more complete fulfilment of seniors' needs (not only in terms of transport), the data on the use of selected tools and solutions by Polish seniors will be described further in the paper.

3. Use of ICT by seniors

When considering the use of ICT for the purpose of better fulfilment of seniors' transport needs, the question about the relevance of such activities should be posed. It is universally believed that computer and Internet access are tools which, especially in case of elderly and disabled people, may increase their ability to participate in social life, as well as improve the quality of life perceived by them [1]. Unfortunately, in reality, elderly people use both computers and Internet (also mobile) far less frequently than the other age groups (see Table 4).

Table 4. Use of computer and Internet by particular age groups (in per cent) in 2017 in Poland

Age	16-24	25-34	35-44	45-54	55-64	65-74	Total
Regular computer use	97.1	92.2	85.1	66.9	46.8	25.6	71.2
Regular Internet use	99.0	94.5	87.5	67.7	47.5	26.0	70.3
Individuals having smartphones	91.5	85.6	74.1	49.4	29.1	14.9	59.5
Internet connection via mobile phone or smartphone	80.6	60.3	45.2	24.3	11.8	5.0	37.8

Source: based on [15] p. 110, 125, 146, 165

The relatively low use of different Internet communication services by elderly people can be noticed (see Table 5), which is alarming if we assume the phenomenon of the substitution of transport needs by new communication opportunities, resulting from the universal Internet access. Based on the presented data, Internet

access is not universal among the group of seniors, and its use for maintaining (or establishing) contacts with other individuals is even less common.

Table 5. Individuals using Internet communication services during the last 3 months of 2017 (in per cent) in Poland

Age	16-24	25-34	35-44	45-54	55-64	65-74	Total
Instant messaging use	68.0	49.0	31.8	15.9	7.2	3.5	29.7
Telephone calls via Internet	57.2	41.7	35.1	25.5	17.0	11.9	31.7
Sending and receiving e-mails	87.4	85.1	73.2	49.3	33.2	17.6	59.8
Social network use	90.5	75.1	56.8	30.6	17.8	9.5	48.0

Source: based on [15] p. 134-135

The marginal significance of the use of Internet for organising transport or special apps can also be noticed in case of a group of people aged 65 and more (see Table 6). We should obviously not forget that the services available within the sharing economy (e.g. BlaBlaCar or Uber) are a relatively new phenomenon in the Polish market and their popularity among the other age groups is not high either. The question whether they will become more popular remains open due to a number of controversies, e.g. related to the legal regulation of such type of services, or problems with verification and trust required for their efficient and effective implementation. Carsharing or carpooling are examples of the Mobility-as-a-Service (MaaS) solutions that by combining different modes of transport aim at limiting the travel with the use of privately-owned vehicles [17].

Table 6. Use of websites or applications within the framework of sharing economy for the purpose of transport organisation in 2017 (in per cent) in Poland

Age		16-24	25-34	35-44	45-54	55-64	65-74	Total
Total		11.5	10.2	6.7	4.2	2.5	0.7	6.2
Users of	dedicated websites or apps	7.5	8.3	5.1	3.0	1.7	0.5	4.6
	other websites or apps	6.2	3.7	3.0	1.7	1.1	0.4	2.7

Source: based on [15] p. 134-135

The potentially low level of ICT use by seniors seems to confirm the concerns raised at various levels, related to the risk of digital exclusion of this social group. Digital exclusion in the literature on the subject is most frequently defined in two aspects: material and non-material. The material aspect concerns the availability of computer and the Internet for a particular person, whereas the non-material aspect is related to knowledge, motivation and needs fulfilled through such access [2].

The lack of equality in access to digital technologies results from the differences in distribution of material, time, intellectual, social and cultural resources [4].

The availability of a specific technology will not result in its regular use if a person does not feel the need to use it. The question arises whether despite such a small degree of the use of computer, mobile phones, the Internet and various communication services, ICT can still be used for better fulfilment of the transport needs of seniors, or the opposite: the increase of ICT use in the activity of providers of broadly defined transport services will have a negative impact on the possibility of fulfilment of the transport needs of seniors, and consequently increase their risk of both digital and social exclusion? An attempt to address this question will be made in the further part of this article.

4. ICT use in transport

The mutual connections between transport on the one hand, and communication and impact of implementation of different modern ICT solutions on the other hand, have been of interest for the scientists since their popularisation. The following phenomena may be indicated here [11, 12]:

- substitution (replacement or elimination), i.e. decreased demand for transport by transferring the fulfilment of a part of needs to a different medium (e.g. use of e-administration or e-banking, teleconferences),
- complementarity (stimulation or impetus), which may take two forms:
 - when higher access to information stimulates the demand for transport (e.g. possibility to use a cheaper offer from a travel agency in online shopping, or when the fulfilment of transport needs creates the willingness to establish contact with the individuals who stayed at home),
 - when ICT use has an impact on the increase of effectiveness in fulfilling transport needs both on the part of the travelling person (e.g. better travel planning thanks to the use of information obtained from the Internet), or entities providing transport services (e.g. better vehicle fleet management by the public transport organiser),
- lack of mutual impact between ICT implementation and transport system (e.g. resulting from the selection of an ineffective solution which was not approved by the users).

As in a majority of cases of ICT use in different sectors, both its direct and indirect influence can be noticed in transport as well [10]. There are many ways in which ICT may have an impact both on the transport of passengers and goods by different means of transport. It is not possible to list and describe (even shortly) all of them due to the limited volume of this paper, especially that the set of available solutions

is constantly expanding. However, the author took the attempt to assign examples of ICT solutions to selected transport system features that are expected by seniors (see Table 7).

Table 7. Examples of ICT solutions that can be used to fulfil senior’s expectations concerning the transport system features

Feature	Examples of ICT solutions that may fulfil the expectations of seniors
Affordable	- integrated fare collection systems, e-tickets, city cards, possibility to buy tickets online/through an app,
Available	- demand responsive transportation, dynamic ride-sharing, planning routes and frequency of connections based on the information obtained from ITS
Barrier-free	- MaaS, e.g.: carsharing, carpooling, autonomous/driverless cars, demand responsive paratransit
Comfortable	- MaaS, e.g. carsharing, carpooling, autonomous/driverless cars, demand responsive paratransit
Comprehensible	dynamic passenger information system in public transport vehicles and stops, online and mobile timetables, travel planning applications
Efficient	- any solutions related to broadly defined ITS that allow to address arising situations based on the information obtained in real time
Friendly	- any channels used for communicating with the user: web portals, mobile apps, hotlines, social media, etc.
Reliable	- any solutions related to broadly defined ITS that allow to address arising situations based on the information obtained in real time
Safe	- any V2V, V2I, I2V solutions that support driving vehicles, parking vehicles, etc.
Secure	- monitoring and quick response systems in public transport vehicles and stops
Transparent	- any channels used for communicating with the user: web portals, mobile apps, hotlines, social media, etc.

The ICT solutions listed in Table 7 do not cover all possibilities within the discussed scope. However, in the light of the data indicating a low use of such basic tools and solutions as a computer or social networks, the question about the actual impact of ICT on the fulfilment of transport needs of seniors is absolutely relevant. When analysing the list of examples of ICT solutions included in Table 7, attention may be drawn to the fact that some of them, applied by the entities that either provide transport services (e.g. public transport organiser) or make means of transport available (car manufacturers, carsharing companies) will influence the general effectiveness of the transport system without any action required on the part of seniors. For example, any solutions related to broadly defined ITS that allow addressing arising situations on the basis of information obtained in real time will improve the system reliability and effectiveness. The same is true for brake and parking support systems that will improve the safety of all traffic participants and enable seniors to use this means of transport longer and more comfortably. The situation is less obvious in case of ICT solutions that require seniors to take action -

certain activities will probably be simpler and carried out more frequently (e.g. obtaining a city card on a one-time basis, or using GPS devices while driving a vehicle) than others (e.g. the use of sharing economy solutions, such as carsharing or carpooling, as indicated by the data from Table 6).

5. Conclusion

The ageing of society and the attempts to meet seniors' needs presents numerous challenges on many levels: social, economic, administrative and political. This also concerns the broadly understood transport sector, which involves different entities (both public and commercial) providing transport services. To some extent, the transport needs of seniors overlap general transport needs reported by other age groups; however, certain significant differences may be indicated, such as e.g. different destinations, preferred hours of making journeys, or expectations in terms of comfort and safety, resulting from the age and health condition.

In considering how the increasingly popular implementation of modern ICT solutions by the entities providing transport services will influence the fulfilment of the transport needs of seniors, the first thing to be taken into account is how these needs and expectations differ from the needs and expectations of other age groups, as well as to what degree seniors use computers, mobile phones, and the Internet. These factors were to serve as the basis for considering whether ICT are a real opportunity to improve the transport needs of seniors, or contrary, whether they may be a reason for the deepening of social exclusion due to smaller availability of certain transport services.

Taking into account the role performed by seniors in the transport system, as well as how specific ICT solutions influence the transport system operation, two general groups of solutions that may be more or less efficient in fulfilling the transport needs of seniors were indicated. The first group includes the solutions implemented and existing regardless of the involvement and actions taken by seniors, such as e.g. Intelligent Transport Systems based on communication between particular elements of a transport system (e.g. V2V or I2V). These solutions influence both the improved fulfilment of the transport needs of other social groups (e.g. through more efficient management of the vehicle fleet owned by the public transport operator), as well as e.g. the improvement of seniors' safety (e.g. all systems based on vehicle communication with other vehicles, as well as braking or parking support infrastructure). The second group includes the solutions whose efficiency depends on the actions taken by seniors themselves (e.g. use of mobile timetables, sharing economy portals or taxi booking apps). This broadly defined type of ICT solutions may have limited efficiency and require taking additional promotional and educational measures. Such activities would be intended to moti-

vate seniors and let them gain competences necessary for the effective use of new opportunities offered by ICT.

To sum up, the progressive implementation of ICT may be both an opportunity and a threat for seniors, depending on the number of factors that require conducting further research in this respect. Additionally, the activities related to ICT used for better fulfilment of the transport needs of seniors require the involvement of institutions at different levels of public administration, companies providing services in the field of transport, non-governmental organisations and the seniors themselves.

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