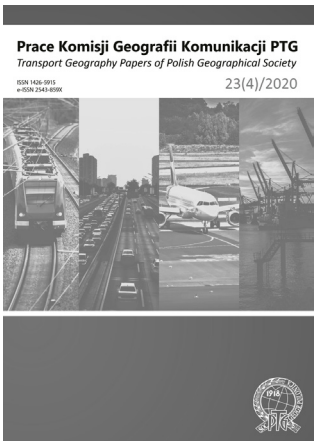

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RESISTANCE IN ADAPTING TO SUSTAINABLE MOBILITY AND NEW SUSTAINABLE MOBILITY INDICATOR – CASE STUDY OF A POLISH AGGLOMERATION

Opór w dostosowywaniu się do zrównoważonej mobilności i nowy Wskaźnik Zrównoważonej Mobilności – studium przypadku polskiej aglomeracji

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Abstract: Sustainable growth is now the foundation of economic growth, especially if the 2020 pandemic prompts the conclusion that the over-exploitation of planet's goods is ultimately turning against humanity. Despite the climate crisis, Poles are reluctant to give up cars, and city authorities in Poland do not increase the quality and efficiency of public transport. Young people around the world are seen as hope for changing trends. The aim of the article is to verify the hypothesis about greater awareness of young people in Poland about climate change, manifested by mobility habits, compared to the older generation. The hypothesis was verified by a study conducted on a group of 67 students commuting to the university at the age of 21-23 and a group of 45 commuters aged 25-65. The Sustainable Mobility Indicator (SMI) was created for the purposes of the article. The SMI considers daily travels of residents of a large Polish city. With the use of the created indicator, the hypothesis was rejected.

Keywords: sustainable mobility, mobility indicator, transport policy, survey research

Introduction

Despite the climate crisis, Poles are reluctant to give up cars, and city authorities in Poland do not increase the quality and efficiency of public transport. Young people around the world are seen as hope for changing trends.

Among the strengths of mobility in Poland Wołek (2018) distinguishes the strong market position of public transport, a change towards the quality of life in most newly created strategic documents at the local level, for resources for creating sustainable mobility in large and medium-sized cities. To this we can add Sustainable Urban Mobility Plans (SUMPs) that are starting to be launched in some cities in Poland. Among the weaknesses, Wołek distinguishes a lack of coordination in space planning at the metropolitan level, architecture of modern cities strongly associated with the past era of planned economy, poor coordination between various strategic documents, a high percentage of individual motorization and still very rare urban logistics planning. Among the opportunities, Wołek distinguishes growing activity of non-governmental organizations, especially in the field of bicycles and quality of life, growing importance of non-motorized transport, growing social participation in the creation of strategic documents, development of shared mobility, international cooperation for sustainable urban mobility planning. Threats include lack of legislative solutions aimed at integrating the metropolis, the continuing trend of growing motorization, lack of funds for sustainable mobility planning in smaller cities and in rural areas (Wołek, 2018).

Lack of good results in terms of environmental protection and the constantly growing population is putting pressure on sustainability in urban spaces. Earth Overshoot Day is the day on which humans' demand for Earth resources exceeds what the planet can offer in a given year. EOD is calculated by dividing the Earth's amount of ecological resources the planet is able to generate, by humanity's Ecological demand/footprint and multiplying by 365. In 2019, Earth Overshoot Day is on July 29, which means that by the end of the year, the humanity exploited double more than the planet could offer.

A tool facilitating the introduction of sustainable mobility can be the Sustainable Urban Mobility Plan defined in the Eltis project and then described by many cities in Europe. It is a transport policy tool that paves the way for achieving sustainable mobility by choosing measures after consulting with stakeholders, engaging stakeholders in the process and changing the paradigm from focusing on passenger cars to alternative ways of mobility. The studied region concerned two border cities of Gdynia and Gdańsk, which constitute one agglomeration together with the city of Sopot, of which Gdynia announced SUMP in 2016 and Gdańsk in 2018.

Literature review

Because it is the transport system that contributes significantly to the situation in any organized space and to generate significant external costs, the emphasis on sustainable development is particularly important in urban areas. Various organizations use transport indicators to assess the progress of projects and policies in relation to their objectives. Sustainable transport, unlike traditional planning, which encourages individual motorization and building new infrastructure, focuses on the promotion of alternative means of transport and the mobility service access rather than on ownership (Tafidisa, Sdoukopoulos, Magda Pitsiava-Latinopoulou, 2016). The World Business Council for Sustainable Development defines "sustainable mobility" as the capability of meeting people's needs to move, communicate, trade easily, having access to modes of mobility and set relations with no sacrifice of other values (social or ecological) today as well as in future. Sustainable mobility cannot be measured as it is, but has to be defined by set of factors that reflect its multidimensionality (WBCSD, 2001). For many, the term "sustainable mobility" simply means whether the model of movement developed by humanity can function within the current challenges and serving future generations. This includes concerns regarding the number of passenger and delivery vehicles, the efficiency of the infrastructure, and which fuel will best meet the challenges of the future.

These thoughts lead to the conclusion that the need for mobility is increasing and will continue to grow. The challenge is to develop strategies that will meet these future mobility needs while not increasing external costs, and even reducing or eliminating them (WBCSD, 2001).

According to the 1992 United Nations agenda, sustainability indicators are essential for determining Earth's carrying capacity. The UN points to the need for authorities and organizations to develop criteria and methodologies to assess environmental impact and resource use, which should be transformed into clear indicators that can be communicated to citizens and decision-makers (United Nations, 1992). According to OECD, indicators can be a tool for making decisions and determining countries' environmental performance. The indicators allow keep track, ensure that environmental dilemmas are taken into account, provide a similar approach to environmental problems (OECD, 2001). Of course, the indicators

are a simplification, which limits the possibilities of inference, which should always be remembered (Bell, Morse, 2008).

Determinants of sustainable growth of a region or country have been studied from a theoretical and empirical point of view, however there is no standardized unified indicator indicating the level of sustainable development in a given region or country. Indicators with measurable parameters help in assessing the current situation and alternative scenarios. Indicators help in evaluation, simplification, trend analysis, communication of issues and comparison between places and situations. A set of correctly selected indicators helps decision makers monitor the statute and understand the consequences of actions or their absence. The Organization for Economic Cooperation and Development country has defined indicators as statistical measures of social environmental and economic sustainability. The structure of the indicator must be simple and transparent so that it is easy to understand for both expert decision makers and the public (Muthu, 2018).

A model approach to sustainable mobility should touch various areas like the quality of life, economic efficiency, etc. However, such a wide range creates difficulties in connection with the ambiguous definition of the quality of life. According to Nicholas et.al, a well-constructed indicator requires several factors, including simplicity, consistency with the statistical base, and important factors of the case. The indicator must give clear and legible results. These authors mentioned mobility service provided, organization of urban mobility, economic cost for the community and expenditures of the participants involved, as well as social and environmental factors, and cited sources of information about these components and estimation methods as sustainability components (Nicholas, et.al., 2003).

Gillis et al., when reviewing the indicators, added mobility efficiency to the three pillars of sustainable development (environment, quality of life, economic growth). Mobility system efficiency includes elements such as: travel (need and ability to move), transport (means of transport, infrastructure) and traffic. According to the authors of these indicators, sustainable urban mobility are: greenhouse gas emissions, energy efficiency, public finances, congestion, economic opportunities, travel time, use of space, quality of public space, access to mobility services, traffic safety, noise, air pollution, comfort, accessibility, affordability, diversity, intermodality, disaster resilience, degree of use (Gillis, et.al, 2015). These indicators however, are intended to measure the sustainable urban mobility of a system. In this paper, an individual indicator of sustainable mobility has been proposed.

Methodology and results

This paper presents the Sustainable Mobility Indicator (SMI) for daily travels of residents of a large Polish city. SMI was created for the purposes of this study. 111 people were examined to prepare it, of which 65 were student youth at the age of 21, and the second group were people traveling to work from 27 to 60 years of age.

The study asked about the means of transport chosen in everyday trips to the university or to work, then asked about the will to change a given way of transport and finally about the attitude towards owning a car.

In everyday travels, ito ndividual means of transport digits were assigned where 1 was the least balanced means, i.e. the car, and 8 was the most balanced way of movement, i.e. fighting.

In the case of the will to change the way of moving – the least balanced answer is the lack of will to drop traveling by own car and this answer was assigned with number 1. The most balanced answer assigned to the number 3 is the answer about the lack of intention to abandon public transport. Tables 1 – 3 show the components of the created SMI.

Each respondent was asked three questions by assigning numbers to them, while the sustainable mobility indicator was defined as the sum of the answers. The higher the SMI level, the more balanced mobility decision a person makes. The maximum achievable value is 16 in a group.

The average SMI in the youth group was 6.9, but the median was 5. In the elderly, the average was 7.29, but the median was 8. Table 4 and 5 show the replies and individual SMI for each respondent.

Discussion and conclusion

Knowing that among factors influencing the decision on which mode of transport to choose, the most important are price, time from door to door, comfort, reliability and access conditions (Berrada, et.al., 2017) it can be concluded that these are not served in the surveyed area. Public transport as an alternative to individual transport should offer high quality services and a competitive offer. The benefits of individual transport include flexibility, accessibility and comfort. (Kłos-Adamkiewicz, 2012). In order for public transport to be competitive, it must move faster and be more reliable. This can be achieved by using bus lanes and by setting the timetable so that citizens know

Tab. 1. Daily trip.

Own car	1	Least sustainable reply
A lift	2	
Uber	3	
Carsharing	4	
Shared mobility	5	
Public transport	6	
Bike	7	
Walk	8	Most sustainable reply

Source: Own elaboration.

Tab. 2. Own car.

Very important	1	Least sustainable reply
Important, not a priority	2	
Maybe I'll buy, not that important	3	
Not in a close future	4	
Not really	5	Most sustainable reply

Source: Own elaboration.

Tab. 3. Will to drop.

I don't intend to drop car	1	Least sustainable reply
Would drop car, if…	2	
I don't intend to drop public tranport	3	Most sustainable reply
Wants to drop public tranport, when…	1	Least sustainable reply

Source: Own elaboration.

Tab. 4. SMI for surveyed students.

Age	Daily trip	Will to drop	Own car attitude	Sustainable Mobility Indicator
21	1	2	1	4
21	1	2	1	4
21	1	1	2	4
21	1	1	1	3
21	6	3	3	12
21	6	3	3	12
21	6	3	2	11
21	1	2	2	5
21	1	2	1	4
21	1	1	1	3
21	1	1	1	3
21	1	1	1	3
21	6	2	4	12
21	1	1	2	4
21	1	2	1	4
21	1	1	1	3
21	1	1	1	3
21	1	2	2	5
21	6	1	2	9
21	6	3	2	11
21	1	2	2	5
21	1	1	1	3
21	6	3	3	12
21	6	1	2	9
21	2	1	2	5
21	6	3	2	11
21	1	1	1	3
21	6	1	3	10
21	6	3	1	10
21	6	3	2	11
21	1	1	1	3
21	1	1	1	3
21	1	1	1	3
21	1	2	1	4
21	6	1	4	11
21	6	3	3	12
21	6	3	1	10
21	1	1	4	6
21	6	3	3	12
21	6	3	1	10
21	6	3	2	11
21	1	2	1	4
21	6	3	2	11
21	6	1	3	10
21	1	2	1	4
21	6	1	3	10
21	6	3	1	10
21	6	1	4	11
21	1	2	1	4
21	1	2	1	4
21	1	1	1	3
21	1	1	1	3
21	6	3	4	13
21	6	3	2	11
21	6	1	4	11
21	8	0	1	9
21	1	2	1	4
21	1	1	1	3
21	1	2	1	4
21	1	2	2	5
21	6	3	1	10
21	1	2	2	5
21	1	2	1	4
21	6	3	2	11
21	1	2	1	4

Source: Own elaboration.

Tab. 5. SMI for surveyed workers.

Age	Daily trip	Will to drop	Own car attitude	Sustainable Mobility Indicator
27	6	3	1	10
27	6	3	1	10
27	6	1	2	9
28	6	1	2	9
29	6	3	3	12
32	1	1	1	3
33	1	2	2	5
34	6	1	2	9
34	1	1	2	4
35	3	2	5	10
35	6	3	4	13
35	6	3	4	13
35	1	1	1	3
35	6	3	1	10
35	1	1	1	3
35	1	2	1	4
35	6	3	2	11
35	6	3	1	10
35	1	2	1	4
35	6	3	4	13
35	6	3	1	10
35	1	2	2	5
35	6	1	1	8
36	2	2	1	5
37	7	0	1	8
42	1	2	1	4
43	1	2	2	5
44	6	3	4	13
45	1	1	2	4
45	1	1	1	3
45	1	1	1	3
45	1	1	1	3
45	1	2	1	4
45	7	0	4	11
45	1	1	1	3
45	1	2	1	4
46	1	1	1	3
46	8	0	1	9
52	1	2	1	4
54	6	3	4	13
55	6	3	5	14
56	1	2	1	4
57	8	0	1	9
58	1	1	1	3
60	6	3	2	11

Source: Own elaboration.

that regardless of what time they arrive at the stop, the bus/tram/train will be expected within the same and relatively short time.

In the examined region, we do not observe above requirements, in the open questions, the respondents mention punctuality and reliability among major shortcomings of public transport. Settlements that arise in the city around the very center of the city often do not have a direct connection to the center or to the interchange, to which they are separated by a distance of 2-3 km. What's more, buses run 20 minutes apart, even during rush hour. Inhabitants of these housing estates are forced to use cars, which causes huge traffic jams on the routes connecting them to the center/junction. In the traffic jams, there are also those rare-running buses, so people who wanted to travel by public transport also change cars. Information about empty buses reaches managers of public transport, who are convinced that there is no demand for higher frequency and privilege, they change nothing and even eliminate connections.

The above-mentioned reasons could explain the reluctance to public transport among all respondents, but why older people are more likely to use alternative means of transport. It is interesting that although the percentage of older people using a car is smaller among the respondents, this does not translate into a greater use of public transport, older people often choose a bicycle, while young people in general (Fig.1). Similar conclusions were drawn a year earlier from 115 students (Matusiewicz, 2019)

Young people in Poland do not reflect the trend visible in other large cities in Europe that access, not ownership counts for them, because Mobility-as-a-Service does not function like in other smart cities. In the studied region, the offer of using sustainable mobility is large – individual transport devices are widely available on the streets. However, young people seem to be discouraged by the unclear message and uncertainty associated with long-term functioning, because the project of renting bikes on time started with an enthusiasm, went bankrupt after several months of operation due to numerous failures and conflict between the city authorities and the project contractor. Young people, knowing that the offer of public transport is unsatisfactory and unreliable, prefer own car. The bicycle in this case is a worse investment, because they often have no place to keep it and in addition the weather in Poland is often not conducive to cycling.

Meanwhile, after years of standing in traffic jams, the elders see the benefits in making the effort to learn about the functioning of MaaS and abandoning the car for a bicycle or walking. For young people, the primary reason for using public transport is price.

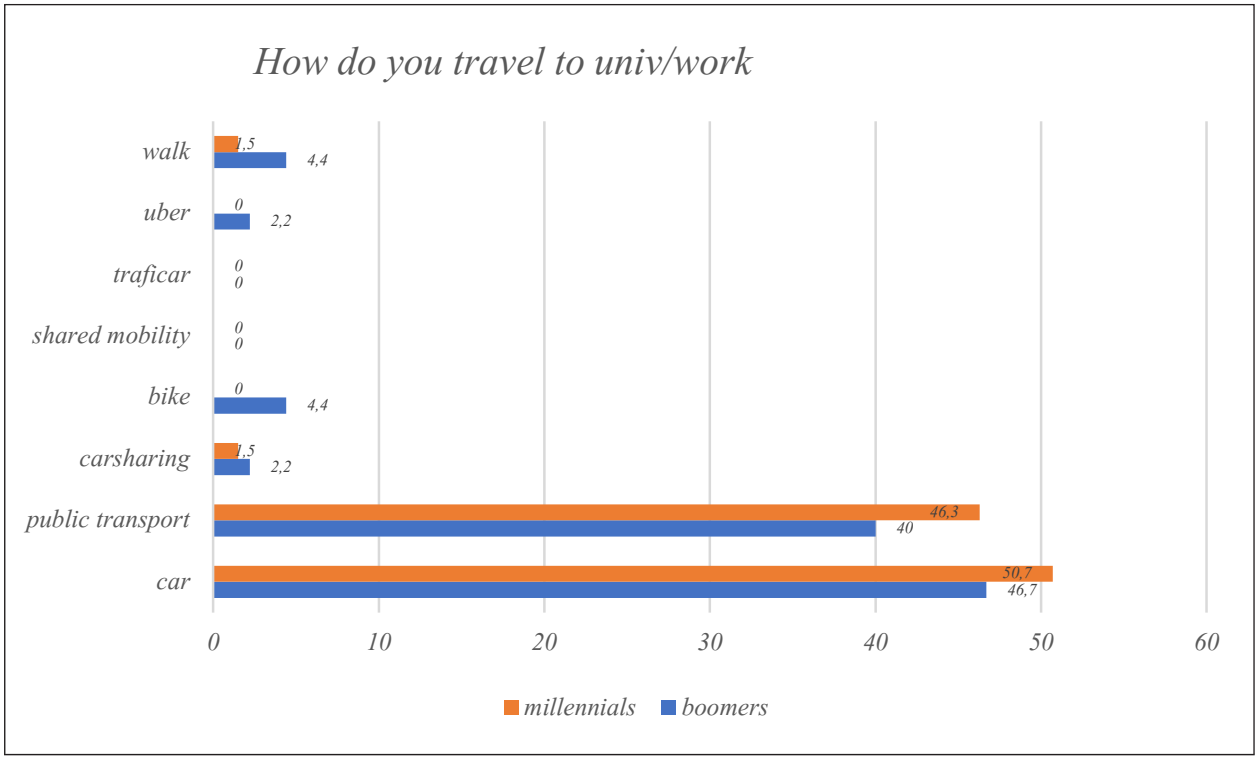

Fig. 1. Answers to the question "how do you travel to the University/work".

Source: Own.

In the research area, despite the SUMP declarations, not enough is being done to increase sustainable mobility, discouraging the use of individual cars, and encouraging the use of public transport. The largest investments are still investments related to road transport infrastructure. The organizers of public transport do not listen to social needs and travel by car themselves.

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