

The role of participation behavior and information in nudging citizens sustainable mobility behavior: a case study of Bratislava region

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Abstract— It is broadly recognized that public participation and citizen engagement can play an important role in making progress towards changing travel behavior and modal shift to use more sustainable and green modes of transport. This research focuses on exploring the potential benefits of citizens and stakeholder engagement in participatory planning for the development of a sustainable urban mobility plan in the region of Bratislava using dialogue marketing and the wheel of persuasion techniques. This study also investigates the role of public engagement and citizens' experiential knowledge and information on fostering collaboration and active involvement in the planning process for increasing the attractiveness and competitiveness of public transport and shared mobility services as the main objective prioritized in the Bratislava integrated regional operational programme. The empirical analysis of this study indicates that 69% of respondents are willing to influence decisions for mobility planning and evaluate the exiting mobility offers in the Bratislava region which is in line with 75% of stakeholders' perception of citizens level of engagement.

Keywords: Participatory planning, Citizens' engagement, role of information, Sustainable urban mobility planning, Marketing techniques

I. INTRODUCTION

Transportation planning plays a key role in addressing individuals' mobility needs considering economy, environment, and quality of people's lives. With the fast pace of urban development, failure in having a comprehensive urban transportation planning can lead to severe problems such as significant traffic congestion, dangerous travel patterns, slow economic growth, adverse environmental impacts, inequality among communities and wasteful use of money and resources. With demographic changes, growth of cities, changes in lifestyles and values and increasing efforts for mobility, developing scenarios for urban planning in response to urban sprawl and increasing demand for social services such as transportation becomes more and more complex. These changes necessitate planning and implementing a sustainable urban transport system that meets businesses and individuals' mobility needs considering new social formations in cities and their surroundings, shifting population compositions, clean and energy-efficient

transportation modes, and emerging mobility technologies. This important fact highlights the significant role of sustainable urban mobility planning (SUMP) as an integrated strategic management tool and a participatory approach in urban transportation development. Outcomes of short and long-term sustainable urban mobility plans should bring more social equity and less social differences through providing the equitable distribution of public transportation and non-motorized transportation facilities in cities and adequate access to residential, commercial, and recreational activity locations for different social classes of people.

In that vein, sustainable and green urban transport systems can be argued as the backbone for efficient mobility of passengers in urban areas which expected to address the passengers' travel demand and reduce the rate of accidents, traffic congestions along with improvement in safety [1] as well as decreasing detrimental environmental impacts of transport (i.e., air pollution) and energy consumption [2 & 3]. In this regard, public transport is considered as the most sustainable and adequate mode of transportation which can compete with personal car when costs increase and solve problems associated with traffic congestion [4]. Therefore, in recent decades, a paradigm shift from private to public transport has been contemplated as a promising solution in urban development. Although in some instances, public transport is perceived as a poor alternative for use of private cars [4], still public transport is regarded as the most sustainable and adequate mode of transportation which can compete with private cars in terms of cost and adverse environmental impacts.

Although the EU policy interest is in promoting tremendously use of sustainable mode of transport and shared mobility, it has to be considered that the citizens participation should be as well a cornerstone in decision making with the purpose of influencing transport choices and changing people's mobility behavior as well-conceptualized in Arnstein's ladder of citizens participation [5]. This form of participation has been taken up and discussed in a domain of transport and mobility planning by several scholars [6, 7,8] in the last few decades to investigate the role of citizens participation and their attitudes and perceptions, level of awareness and acceptance as drivers for boosting paradigm shift to use

sustainable modes of transport and promote the use of public transport for daily urban trips.

Hence, it can be argued that involving citizens and stakeholders in either form of public deliberative engagement or deployment of tailored communication methods such as targeted marketing techniques for linking bottom-up and top-down decision making for the sake of co-planning and co-design of transport systems would escalate the high public acceptance of sustainable mobility solutions and behavioral change in nudging more use of public transport and emerging shared mobility services in line with successful implementation of sustainable mobility action plans as outlined in the EU-funded project guidelines (e.g. CHALLENGE, PILOT) [10&11].

Since engaging citizens in sustainable mobility co-planning is often conceived as a big challenge by local authorities in Central and East European countries, therefore, by employing the case study of Bratislava region, the present study focuses on addressing the following research questions:

- 1) How people might be persuaded to more often travel by public transport and shared mobility services instead of by car in the region of Bratislava?
- 2) How citizens' engagement techniques can support nudging sustainable mobility behaviours?
- 3) How stakeholders training can support participatory mobility planning?

II. METHOD

Considering a strong passion for car ownership and use of private car for daily mobility in Slovakia, establishing deliberation between local transport authorities and citizens that share a democratic procedure in participatory sustainable mobility planning; is imperative. That being the case, to scrutinize the awareness of the citizens of the Bratislava self-governing region about services related to mobility and their interest in participating in the process of designing and planning sustainable mobility, an online survey was conducted in the region as part of the Interreg Europe e-smarterc project.

Citizens' and stakeholders' engagement in both decision making and the daily operation of the cities is vital for developing good mobility plans. Therefore, the survey as an engagement method for dialogue marketing technique was designed to collect participants views on increasing the attractiveness and competitiveness of public transport by promoting sustainable, easily accessible, and cost-effective public transport network and reducing the use of individual motorized transport as prioritized in the integrated regional operational programme (IROP). The questionnaire consisted of three parts: current travel behavior and willingness to switch to environmentally friendly transport modes, information behavior focusing on transport options in the region and citizens' participation behavior. The data used in this paper collected during March and June 2021 covered the area of the Bratislava self-governing region: 5 districts of Bratislava, Pezinok, Malacky and Senec.

As shown in Tab. 1, the survey involved 95 respondents, of which more than half were men. In terms of age, most respondents were between 31 and 50 years old (48.4%),

TABLE I.
SOCIO-DEMOGRAPHIC CHARACTERISTICS OF THE SAMPLE (N=95)

Socio-demographic characteristic		n	%
Gender	Female	42	2.1
	Male	51	53.7
	Other	2	44.2
Age	16-20	9	9,5
	21-30	22	23,1
	31-50	46	48.4
	51-60	12	12.6
	61+	6	6.3
Place of residence	Bratislava	43	45.3
	Senec	48	50.5
	Pezinok	3	3.2
	Malacky	1	1.0
Education	Primary	3	3.2
	High School	25	26.3
	University	67	70.5
Occupation	Employed	64	67.4
	Student	13	13.7
	Self-employed	7	7.4
	On parental leave	7	7.4
	Other	4	4.2

followed by 21 to 30 years old (23.1%). The age distribution of the sample was probably influenced by the selected form of the survey. Regarding other socio-demographic characteristics, most of the respondents had a university degree (70.5%), were employed (67.4%), and lived in districts of Senec (50.5%) and Bratislava (45.3%).

To facilitate the active engagement of citizens in mobility planning, the hands-on training in relation to the SUMP advancement was also organized as part of the Interreg Europe e-smarterc project to implement a set of capacity building activities and supporting materials relying on the wheel of persuasion technique in order to improve the co-planning and awareness raising on sustainable mobility. Currently, representatives from the Bratislava self-governing region in cooperation with their stakeholders are working on developing SUMP for the entire Bratislava self-governing region. It focuses on ensuring the balanced development of a transport system in the region, while responding to negative trends in the effectiveness of meeting the mobility needs of people, goods and services, road safety and environmental impact. Hence, the aim of the training was to provide the information and tips on different marketing techniques which can be used for involving citizens and stakeholders in developing and implementing SUMP. The training event was held online via MS Teams, while InVision's online whiteboard that enables visual collaboration between users in real-time, was used for the implementation of interactive exercises. The training was attended by representatives of Bratislavská integrovaná doprava (Bratislava Integrated Transport, Inc.), one of the main stakeholders of the Bratislava self-governing region, which covers mobility services in the region.

III. RESULTS

A. Current travel behaviour and attitudes toward public transport

To increase the attractiveness and competitiveness of public transport through its promotion, it was first necessary to analyze the current travel behavior of respondents (reasons of their trips, most used transport mode) and their attitude towards public transport. Based on the survey results, it was found that 77.9% of respondents travel every day mainly due to work or school. More than half of the respondents (51.6%) said they use a car for everyday travel. The second most common means of transport was public transport (42.1%). One of the main reasons why people travel by cars in the Bratislava self-governing region is speed and time reduction (67.3%). In the case of public transport, the main reason is congestion of other transport modes (Fig.1).

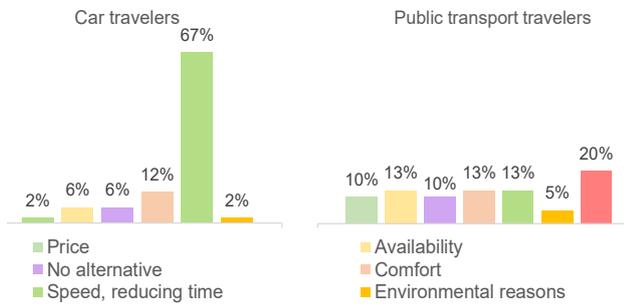


Figure 1. Reasons for using car and public transport during daily travel

Fig. 2 compares the satisfaction of car travelers and public transport travelers with the features of public transport services. Car travelers are most dissatisfied with the price of tickets and amenities for passengers at the stations and stops (e.g., shelter, seats, light). On the contrary, they are most satisfied with the security, payment method for tickets and the possibility of using one ticket for several modes of transport.

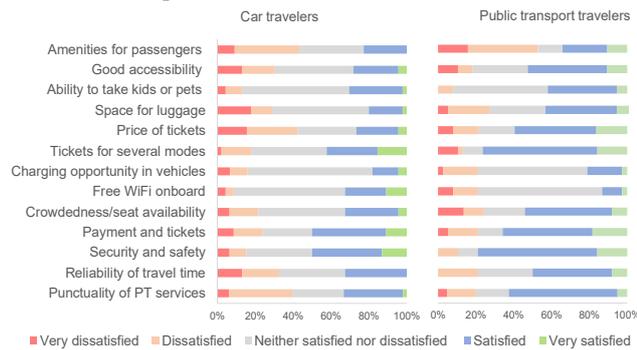


Figure 2. Satisfaction of car travelers and public transport travelers with the features of public transport

Public transport travelers are most satisfied with security and safety, possibility to use one ticket for several transport modes, punctuality of public transport services and price of tickets. As with car passengers, the highest dissatisfaction was identified for amenities for passengers at the stations and stops.

In addition to the current travel behavior and evaluation of satisfaction with public transport, the willingness of car

drivers and passengers to switch to more environmentally friendly transport modes was also analyzed. Up to 69% of the respondents who use a car for their daily travel would be willing to switch to transport modes such as public transport, cycling, or walking. Respondents would be willing to use other modes of travel, especially if they were available in terms of connectivity and frequency of services and as fast as car travel.

B. Awareness of transport options in the region

Good information of citizens about the possibilities of public transport is key in influencing their future travel behavior. Therefore, the satisfaction of the population with the public transport information and ways of obtaining it were also analyzed.

Based on the survey results, it was found that up to 43% of respondents are very satisfied or satisfied with the information about available public transport services. On the contrary, 16% of respondents indicated that they were not satisfied, and the rest, 40%, could not decide.

Fig.3 shows that citizens mainly use mobility apps, the website of transport companies and associations and social media to get the information about transport options in the region. It can also be seen that the information from information centers is used only by 10% of respondents, and rarely.

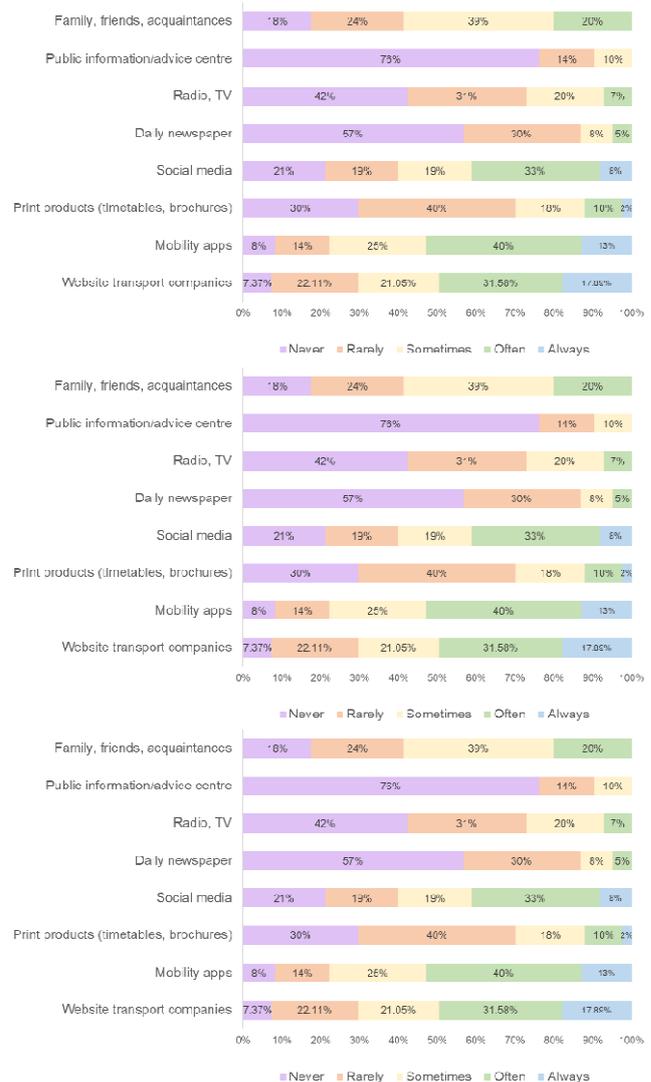


Figure 3. Channels of obtaining information about transport possibilities

Regarding the issues with obtaining the information, the respondents mainly indicated that they would like to have more information about mobility options (46%). Specifically, they would like to have access to the reliable real-time information (57%). Besides, 42% of respondents do not know where to look for the necessary information, and 40% need the information that is easier to be understood. On the contrary, 40% of respondents said they feel sufficiently informed.

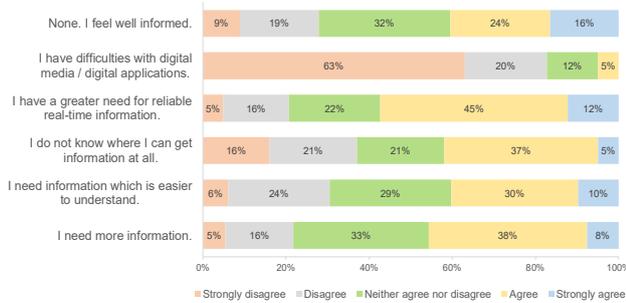


Figure 4. Issues with obtaining information about transport possibilities

C. Participation in mobility planning

To increase engagement of citizens in mobility planning and making it more attractive, the survey also reviewed citizens' attitudes towards their participation in mobility planning.

Firstly, citizens' participation in the Sustainable Urban Mobility Plan (SUMP) of the Bratislava region was investigated. As can be seen (Fig. 5), 57% of respondents did not know about SUMP, 34% heard about it and only 4% participated in its preparation.

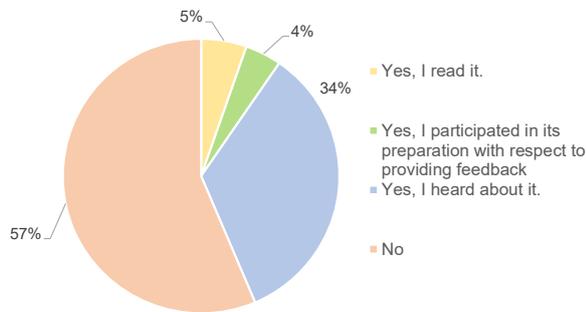


Figure 5. Citizens' awareness of the new SUMP of Bratislava self-governing region

People who heard about SUMP or participated in its development received the information mainly from social media such as Facebook, Twitter, or Instagram (54%). Other important sources of information were the website of the Bratislava self-governing region (29%), family, friends, colleagues, and other people (22%).

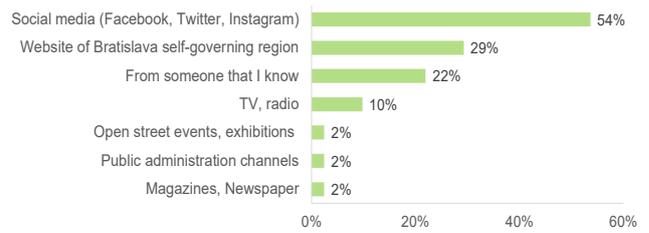


Figure 6. Citizens' interested channels in obtaining information on mobility planning

As can be seen in Fig. 7, 21% of respondents like to obtain information about mobility planning in their region very often and 41% on a regular basis, which means that more than 60% of respondents is interested in mobility planning and they would like to know about activities implemented in their region.

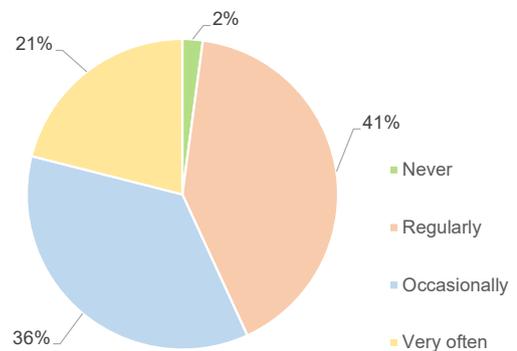


Figure 7. Citizens' interest in obtaining information on mobility planning

So far, 42% of respondents have participated in the mobility planning process, which, compared to previous results, means that even people who have not yet participated in the planning process are interested and are willing to use this opportunity in future.

However only 19% of respondents think that their opinions could make a difference in mobility planning and projects, and 45% believe that to some extent only.

In terms of satisfaction with citizens' involvement in the transport planning processes in the region, it was found that only 18% of respondents were very satisfied or satisfied and 37% dissatisfied or very dissatisfied.

Regarding the purpose of participation in mobility planning (Fig. 8), respondents would mainly like to influence decisions (69%), getting the information on current offers and debates (65%), and evaluate existing offers (60%). Less attractive motives for citizens are co-developing and designing new projects (20%) and engaging in active exchange with other citizens and stakeholders (15%).

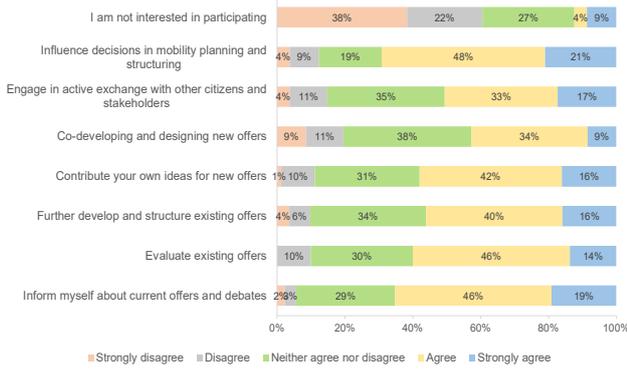


Figure 8. Purpose of citizens participation in mobility planning

The way in which citizens would be willing to participate in mobility planning processes was also analyzed (Fig. 9). Based on the survey results, 31% of respondents would be extremely likely, and 56% very likely involved in mobility planning through surveys. In addition, citizens would very likely use digital participation forms (online forums, social media-based dialogues, online workshops, etc.) and participate in public consultations.

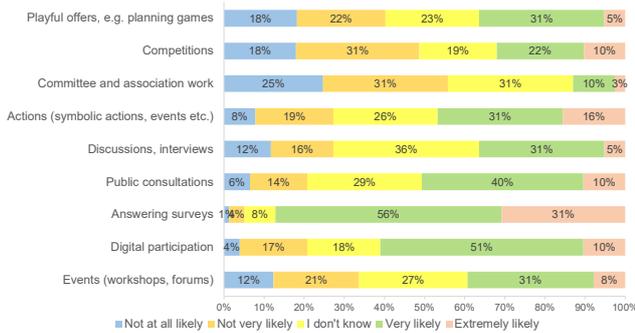


Figure 9. Attitudes of citizens towards methods for their involvement in mobility planning processes

On the contrary, the least interesting methods for involving citizens in mobility planning are participation in committees and associations, competitions, and playful offers such as planning games. Respondents were also asked to identify what should be done to make the methods for engagement in the mobility planning process more attractive. Regarding the events and digital participation, the respondents mentioned the time and method (online, offline) as the most important factor together with better promotion of events and easy access to the information. For surveys, the respondents considered their length and time, the simplicity of the questions and the appropriate motivation to be key factors. The citizens would also like to have access to the results of the surveys. As with events and digital participation, interviews need to be well promoted (especially their time, purpose, and place). It is also important that they are attended by experts who provide the relevant information to the citizens. In addition to the factors already mentioned, respondents would like to see that their participation can influence decisions in mobility planning.

Finally, the reasons that prevent respondents from participating in mobility planning in their region were identified. Fig. 10 shows that most respondents have not

been informed about such opportunities, 36% of respondents are interested but do not have time, and 9% said they are not interested in mobility planning activities.

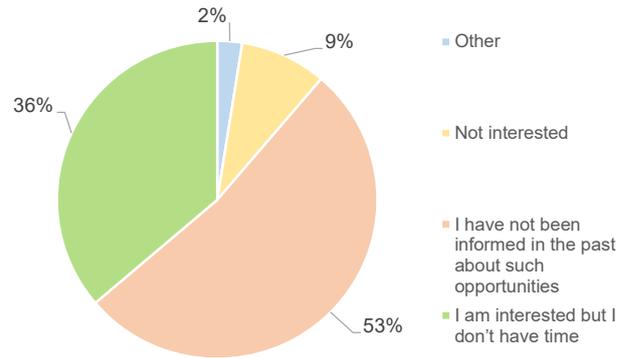


Figure 10. Reasons for not taking part in mobility planning processes

D. Stakeholders opinion on public engagement in Sustainable mobility planning

To demonstrate the stakeholders' perception of the participatory mobility planning in a real-life project and the expected level of citizens participation, the following questions have been asked through an anonymous online poll.

When stakeholders have been asked to expose their view on which sectors should be involved in the engagement procedure for mobility planning and SUMP phases, 50% of participants believe that engaging all relevant stakeholders and citizens in mobility planning procedure is essential (Fig.11).

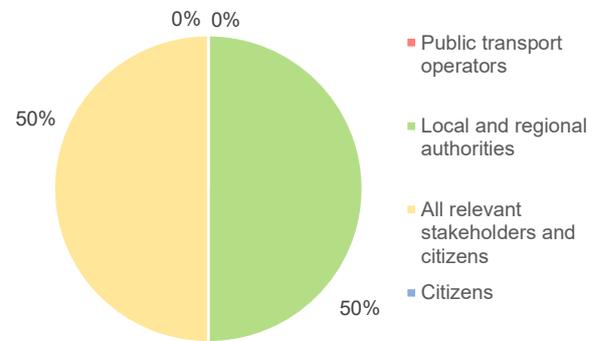


Figure 11. Essential players to be involved in the engagement procedure for mobility planning and SUMP phases

With respect to "the highest expected level of participation in mobility planning", almost 75% participants marked the involvement as the highest level of participation, while 25% of participants believe "Collaboration" is a key element in the highest level of citizens' participation (see Fig.12).

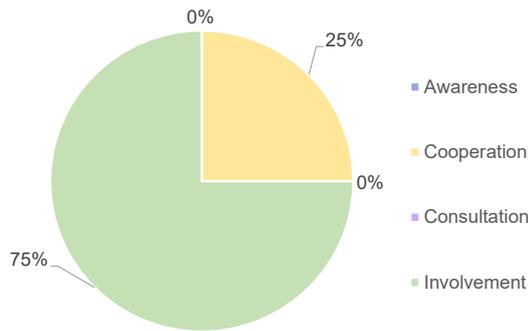


Figure 12. Stakeholders' perception on the highest level of participation

As a part of hands-on training survey, the stakeholders' perception on possibility of using gaming and gamification methods in two phases of SUMP: Phase 1 "current data analysis" and Phase 2 "assessment of scenarios" have been also analyzed. As presented in Fig. 12, 60% of participants declared the "gaming and gamification" can be used in both phases, while 20% of participants selected "In phase 2- assessment of scenarios", and 20% of respondents do not see "gaming and gamification" relevant in either of the two SUMP phases".

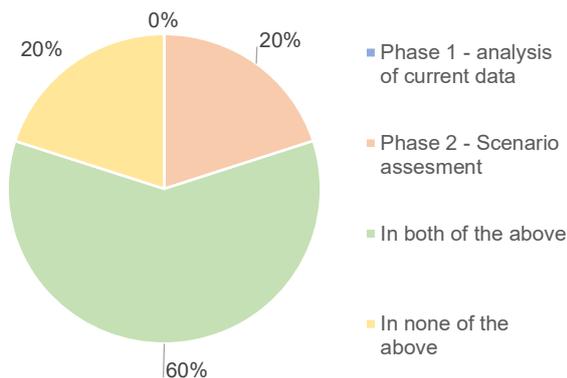


Figure 13. Stakeholder perception on possibility of deployment of gamification methods in a participatory sustainable urban mobility planning

IV. DISCUSSION

Stakeholder involvement and citizen participation practices in transport planning vary across European countries and between cities within a country [12]. Some countries have formal, mandatory consultation procedures for mid- and large-scale transport projects as well as for the development of transport plans and SUMPs (e.g., for Local Transport Plans (LTPs) in the UK and for Plan de déplacements urbains (PDU) in France). Also, some European countries have extensive experience in innovative participation instruments in complex planning processes, such as the Netherlands, Belgium and Germany. However, there are also countries in Europe that have no procedures or only very limited formal procedures for involving citizens and stakeholders. Here, transport planning still focuses on traffic and

infrastructure rather than on planning for and with people. Some Central and Eastern European countries, including Slovakia, belong to this group that has yet to adopt sustainable urban mobility planning that takes citizens and stakeholders as the focus.

It can be argued that a value of a participatory planning approach in Sustainable Urban Mobility Planning is twofold: 1) It increases awareness by using actions and techniques which aim to inform, train, or educate citizens, with the goal to change behavior towards sustainable modes of transport. 2) It engages in co-planning by using techniques and methods that aim to foster collaboration and active involvement of the stakeholders in the planning process. Concepts such as 'co-creation' and 'co-production' are methods of a participatory approach, which leads to a trustful and sustainable collaboration between authorities, stakeholders, and citizens by fostering a two-way interaction between participants. The participatory approaches create opportunities where the public can collaborate with the stakeholders and highlight all available resources.

As revealed from the hands-on training in the Bratislava self-governing region, while mobility planners and stakeholders were familiar with some marketing techniques, they were not well-acquainted with a way how to apply them across SUMP phases. Therefore, the training became an opportunity for developing and improving the skills and knowledge of mobility planners and stakeholders of the Bratislava self-governing region on methods and tools of employing marketing techniques in SUMP.

Furthermore, the survey results showed that in general, the citizens have no or just a little information on how they can be engaged in mobility planning. Within the hands-on training it has been demonstrated that there is a great variety of involvement methods and techniques ranging from tools for information giving and gathering to interactive engagement, such as public meetings, focus groups, or stakeholder conferences.

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