

SHAPING SMART MOBILITY IN GDYNIA

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Abstract

The rate of urbanization in the world is constantly increasing. At present in the European Union nearly 70% of inhabitants that live in cities play an increasingly important economic role and are essential for the proper functioning of the economy. With the development and sprawling of urban areas, the way of managing cities are changing. Rising transportation problems have triggered the idea of smart mobility. A new approach to urban mobility means creating co-modality between public and private means of transport and optimizing the use of various modes of transport, often using modern ICT. The aim of this article is to present initiatives and projects undertaken in Gdynia on sustainable and smart mobility, and to explore citizens' awareness and opinions on these activities. An anonymous questionnaire was used to carry out the pilot survey. The questions verified the knowledge of respondents about the pro-ecological behavior and the concept of a smart city (and its areas). The accepted research hypothesis points to an insufficient change in the communication behavior of the inhabitants in the face of the projects carried out in Gdynia over the past few years. Thus the lack of adequate awareness of the inhabitants in the process of shaping intelligent mobility.

Keywords: Smart mobility, sustainable mobility, pilot survey

1. INTRODUCTION

The rate of urbanization in the world is constantly increasing. At present in the European Union nearly 70% of inhabitants that live in cities play an increasingly important economic role and are essential for the proper functioning of the economy [1]. With the development and sprawling of urban areas, the way of managing cities are changing. Increasing use of ICTs and the need for an integrated approach to the management of modern cities have spawned the idea of creating smart cities. One of its key areas is smart mobility, which is based on the principles of sustainable development. A new approach to urban mobility means creating co-modality between public and private means of transport and optimizing the use of various modes of transport. The aim of this article is to present initiatives and projects undertaken in Gdynia on sustainable and smart mobility, and to explore citizens' awareness and opinions on these activities. An anonymous questionnaire was used to carry out the pilot survey. The questions verified the knowledge of respondents about the pro-ecological behavior and the concept of smart city (and its areas). The accepted research hypothesis points to an insufficient change in the communication behavior of the inhabitants in the face of the projects carried out in Gdynia over the past few years. Thus the lack of adequate awareness of the inhabitants in the process of shaping intelligent mobility.

2. SMART MOBILITY AREA

The concept of smart mobility is constantly evolving. Initially associated with ICT and Intelligent Transport Systems (ITS), it currently covers ecological solutions, sustainable development of the transport system and its accessibility, and citizens' views on its subject [2]. According to the Mapping Smart Cities in the EU report, 21% of European cities use the concept of smart mobility [3].

The emerging literature defines the notion of smart mobility in a different way. The Vienna University of Technology has made its own model of "smart cities" (**Figure 1**). In this model, they conducted research in several dozen European cities, taking into account their smart behaviors. Smart mobility has been identified

as the third most important area in terms of the number of points awarded (after smart living and smart economy). Referring to **Figure 1**, within the framework, smart mobility was examined (from the most important ones): sustainable development of the transport system; ICT infrastructure; local transport system; international availability [4].

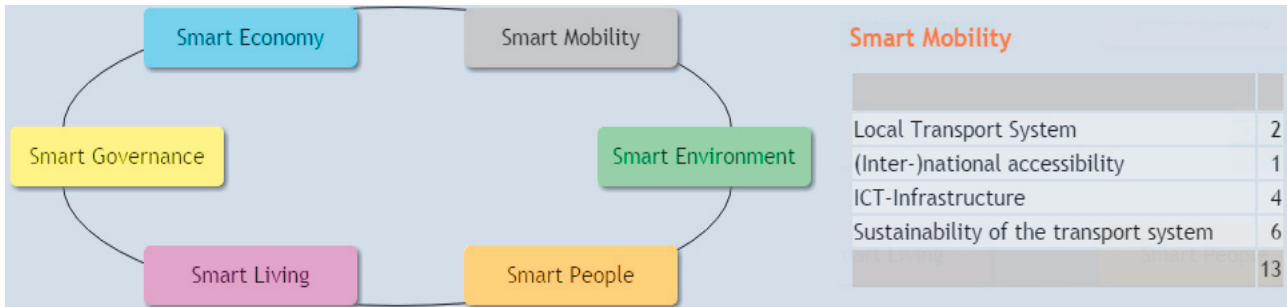


Figure 1 Smart city model

On the other hand, the staff of the University of Genoa in their analysis have shown that certain assumptions about smart mobility, considered obvious or essential, are not necessarily required. For example, there is no need for ICT to implement smart mobility activities. This may concern locals who have “better habits”; those who use public transport or bicycles in their daily travel instead of a private car [5].

The main assumptions of smart mobility are the limitation of traffic, pollution and noise emissions, and increased road safety. The role of smart mobility is to strike a balance between environmental protection, residents' needs, expectations, and associated costs. The smart mobility concept is built at the local level, so the cities form it themselves or in collaboration with other urban areas in the region [6]. The basic activities implemented in the framework of sustainable and intelligent mobility include:

- Developing public transport (electric, hybrid, solar powered, etc.)
- Promoting bicycle (also electric) as a means of urban transport and building urban bicycle systems
- Demand management for parking (creation of paid parking zones, use of cameras and mobile applications)
- Giving priority to public and bicycle transport (bus lanes, dedicated lanes and bays for bicycles, etc.)
- Developing sharing economy, creating car-sharing and carpooling systems, separating high-occupancy vehicles (HOV) lanes
- Park & ride, park & bike parking building
- Mobility management, mobility plans, change of organization of traffic, e.g. woonerf (living streets) implementing

3. SUSTAINABLE MOBILITY IN GDYNIA

The development of sustainable urban mobility in Gdynia over the past several years has been influenced by many documents. Among them are the strategic documents of the European, national, regional, metropolitan and local levels. Gdynia has also embarked on a number of European projects to improve urban mobility, including Civitas Dyn@mo, FLOW, SEGMENT. This paragraph will present selected initiatives that play an important role in shaping sustainable and smart mobility in Gdynia. These include activities to encourage the activation of pedestrians and cyclists and the use of sustainable means of transport.

Gdynia as a developing city faces many transport challenges. One of them is the increasing travel time and congestion, as a result of the growing use of passenger cars (**Figure 2**). A number of measures to promote public transport have been undertaken under the Civitas Dyn@mo project. Designated bus lanes were implemented in the city to encourage residents to travel by bus. Their total length is 2,120 m. Gdynia also

promotes ecological transport by modernizing trolleybuses. The trolleybuses of Gdynia have a 27% share in the entire public transport fleet that provides services for ZKM Gdynia. In 2016, in Gdynia there were 93 trolleybuses used, running 16 trolleybus lines (on access and exit lines) [7]. Some vehicles are equipped with lithium-ion batteries for energy recovery during braking and traverse without traction.

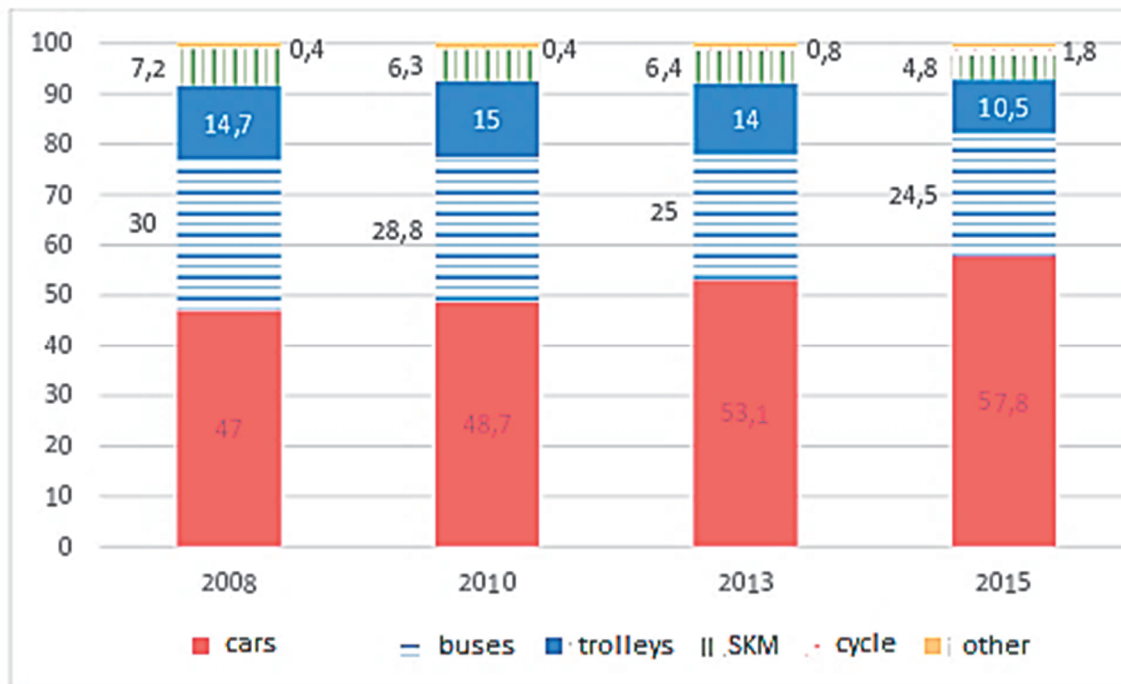


Figure 2 The daily average of motorized trips (non-pedestrian) in Gdynia since 2008 to 2015 year

To improve traffic management in the Tricity area (Gdańsk-Gdynia-Sopot), the TRISTAR system has been implemented gradually since 2012. This integrated traffic management system provides commuters with access to full information on a range of traffic conditions through: traffic problems and speed limits, electronic displays showing the actual time of public transport vehicle departures, parking information signs with the quantity of parking places available and signs warning of weather conditions. Ultimately the system is supposed to include almost 80 crossroads in Gdynia [8].

Currently the share of cycling in modal split is about 2% in Gdynia. To make the situation change in a positive way, the city participated in the European Cycling Challenge and led campaigns to encourage children and workers to cycling e.g. "I cycle to work" competition [9]. There is plan to implement Metropolitan Bike System in 16 boroughs in Spring 2018. The system will provide 3500 bikes with GPS module, electronic lock and alarm (4th generation system) [10]. 1100 of these bikes will belong to the Gdynia fleet. The city also develops bicycle infrastructure by creating new connections and bicycle parking.

Gdynia does not provide car-sharing system and there is not any private operator that provides such comprehensive services. However, the first steps have already been taken. In March 2017, the office announced that talks were underway to implement the urban car-sharing system. In April, an electromobility cluster was created which will work on the prototype construction of an urban electric car for car-sharing.

Gdynia is also trying to implement a project aimed at implementing renewable energy sources for public transport. It assumes adaptation of trolleybus roofs and installation of a photovoltaic power plant up to 499 kWp. The annual power consumption of traction power is 9.5 kWh. According to the assumption, solar power has a traction network in about 5% [11].

4. THE PILOT SURVEY REASERCH OF SMART MOBILITY IN GDYNIA

A survey was used to verify the knowledge of respondents about the pro-ecological behavior and the concept of smart city (and its areas). The pilot survey was completed by 182 students of Gdynia Maritime University (151 full time and 31 extramural) and 19 employees of the university. The study consisted of 13 questions about transport and the concept of smart city.

The respondents indicated public transport as the most used mode of travel, and in most cases, rated the quality of its operation well. Only 1.3% of the respondents use the bicycle in urban journeys. The respondents believe that the city should expand the road infrastructure and invest in intelligent traffic control systems (**Figure 3**). The issues of promoting cycling as a means of transport and a carpooling system are considered insignificant. Only 2% of people thought that motor traffic in the city should be limited. At the same time, residents are dissatisfied with Gdynia's efforts to solve transport problems or find them inadequate and ineffective. So most of them travel in Gdynia inconveniently, especially during peak hours.

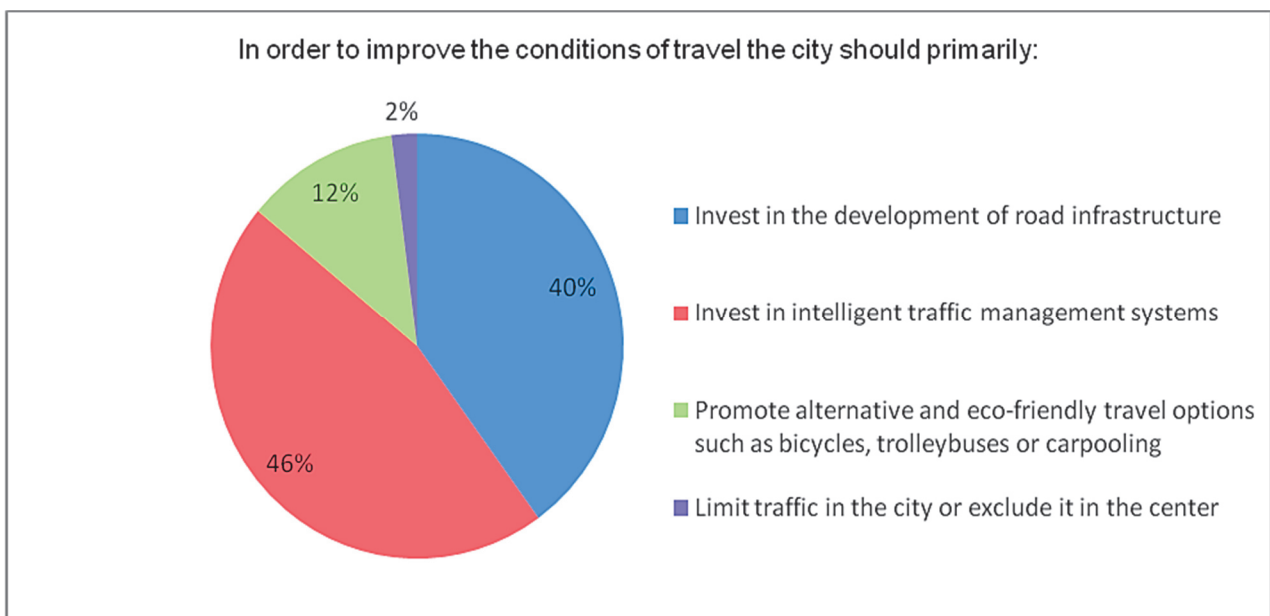


Figure 3 Respondens's opinion on investment in improving transport

The respondents rated TRISTAR fairly well but also noted that the system is not currently fully functional. However, this may change in the future. In order to communicate with the inhabitants and gather their opinions, as well as to inform about the actions undertaken for transport, the city of Gdynia has created the mobilnagdynia.pl website. However, most respondents (59%) never used this portal, which limits awareness of sustainable approaches and ecological solutions.

As part of the Enter.Hub project, car traffic is being shut down at Starowiejska Street at Gdynia's main railway station to improve the conditions for pedestrians, cyclists and public transport. 58% of respondents considered this to be negative because of the limited freedom of car movement. At the same time, 83% of the respondents said that promoting cycling to work as part of a cycling campaign is a good idea to improve the transport and environmental situation in the city.

78% of respondents think that Gdynia is aspiring to be a smart city and may be in the future (**Figure 4**).

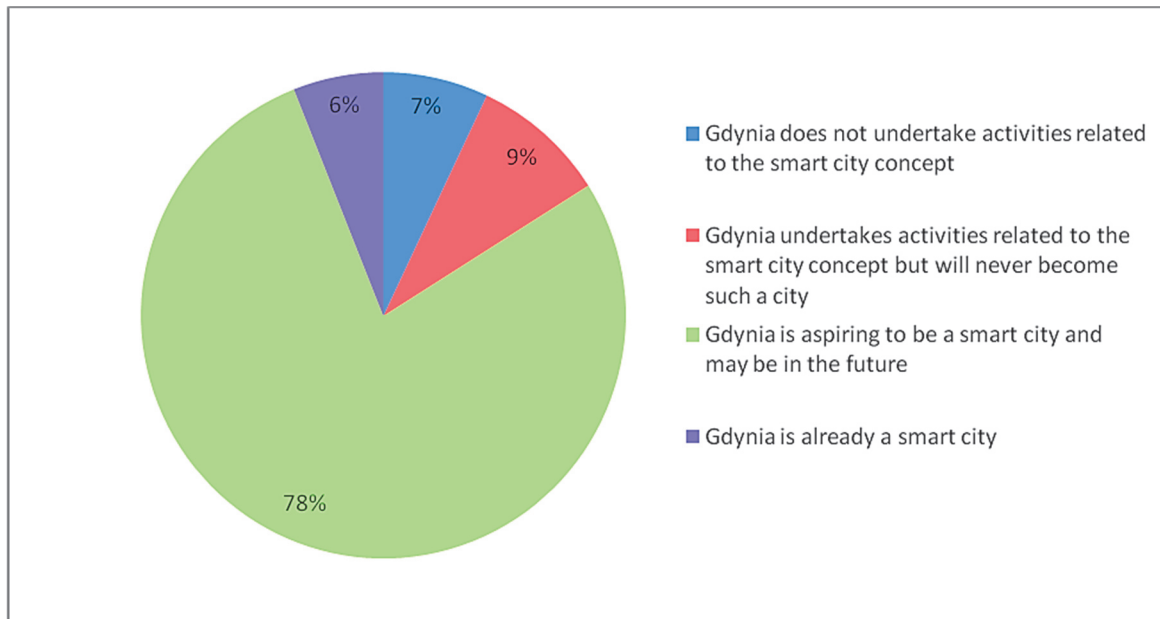


Figure 4 Reviews about Gdynia as a smart city

5. CONCLUSION

Contemporary metropolis have to solve transport problems to keep sustainable development. Many of them is connected to different economy aspects and require cooperation between several sectors [12]. Transport causes major environmental pollution particularly road transport. Gdynia, which promotes itself as a city of innovation, participates in many projects, both transport and innovative. The biggest project - Sustainable Urban Mobility Plan (SUMP) has been prepared within the EU project entitled CIVITAS DYN@MO and was implemented in Gdynia in 2012-2016. A good initiative for the future is to commence the implementation of the car-sharing system, the metropolitan bicycle system and the construction of a photovoltaic panel farm.

In spite of the recognition of a bicycle promotion campaign as good, the survey shows that not all respondents follow the adopted strategies by Gdynia and few travelers are traveling in this way. Many prioritize the expansion of the car infrastructure. Attention is also drawn to the low awareness of the existence of the mobilnagdynia.pl portal. Many respondents consider Gdynia as a city aspiring to be a smart city in the future. They should remember, however, that smart cities are inhabited by smart people. These residents are aware of the principles of sustainable development and ecological problems.

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