

Sustainable Transport as a Function of Sustainable City Development

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Abstract - Over the past twenty years the number of car drivers and traffic levels have increased in all large cities. The increased use of automobiles has multiplied certain side effects, such as congestion, growing number of casualties in traffic accidents, noise, air pollution etc. These factors directly or indirectly affect the quality of life of the inhabitants of large cities. Modern approaches in solving the above mentioned issues can be found in the principles of sustainable transport, which evolved as a part of the strategy of sustainable development.

This paper presents a research into the knowledge of the sustainable mobility characteristics conducted in a local self-management unit among the responsible persons who have an important role in defining and implementing the policy of sustainable transport development. Upon completion of the survey, statistical data analysis indicated a low level of knowledge about the characteristics of sustainable transport types in street and road networks. In order to efficiently implement the policy of sustainable mobility in the transport system it is necessary to increase the level of knowledge of the responsible persons and, after that, develop policies of sustainable transport development which would necessarily include the population education.

Keywords---sustainable transport, sustainable development, policy

I. INTRODUCTION

RAPID industrial development and the traffic rate increase, as well as the excessive forest exploitation have led to intensive climatic changes which adversely affect the flora and fauna and a community as a whole. Transport system is one of the basic factors of economic growth and the life quality of citizens. At the same time, it is one of major environmental polluters, primarily due to the vast emissions of harmful gases from motorized means of transport, and also a significant cause of climatic changes, impoverished biological diversity, noise, vibrations, and the significant reduction in the safety level for traffic participants. The ecological damage caused by transport is on the constant increase. This raises the question of how to ensure the continual mobility development while simultaneously protecting the nature, that is, how to reduce the emissions of harmful gases, noise level and the number of traffic accidents.

The development of human civilization is on the rise, and therefore area and resources consumption are to be expected in the future. As living environment and its resources consumption have their limits, further development has to be „coordinated development-sustainable development” for a „sustainable future”. Lester Brown has stated: „In the strictest sense, general (global) sustainability means endless (permanent) survival of human kinds in each part of the world. In broader terms, it means that all human beings that are born live, to their old age, a life of greater quality than that of pure biological survival. And, finally, speaking in the broadest terms, global sustainability also implies permanent existence of all the biosphere elements, even of those which are seemingly not especially important to the human kind.” [1]

The most quoted definition of sustainable development that can be found in the report entitled „Our Common Future” which, at the United Nations request, was made by the World Commission for Environment and Development in 1987, is as follows: „The sustainable development is the development which satisfies the present needs at the same time not jeopardizing the chances for the future generations to satisfy their own needs.”[2]

Sustainable development- therefore sustainable transport development itself, is based on the inter-generational equality principle. If this principle is not obeyed, then the damages to the environment made in one generation are passed on to the next generation [3].

II. SUSTAINABLE CITY DEVELOPMENT

A city represents a complex system of diversified functions which are spatially jagged. Within an urban area there is a constant need of citizens for motion in order to satisfy their various needs, primarily related to commuting, shopping, recreation, etc. On the other hand, there are no activities or areas in a city which are in some capacity not dependent on goods purchase or dispatch related transport [4]. Alongside positive effects, the negative effects of current policies regarding transport systems of urban agglomerations are becoming more and more prominent. The adverse effects of the traffic rate increase and ever more intense use of motorized means of transport in cities are: harmful gases emissions, increased energy consumption, high levels of communal noise, increased number of traffic accidents, significant overtaking of space and time in already limited urban environments, thus decreasing the possibilities for the performance of other activities.

The increase in the number of individual passenger cars imposes the need for a broader traffic network which, in turn, leads to the reduction of green areas in cities, increased air

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pollution and, consequently, to the degradation of the environment. As a result, the transport areas for non-motorized flows are getting smaller, as well as the possibilities of citizens to walk freely. Increased pollution levels and smaller possibilities for free movement of citizens within a traffic network (walking, using bicycle, etc.) lead to the decreased level of life quality in urban agglomerations. The crucial question is how to ensure a continuous mobility development and, at the same time, protect nature, that is, how to reduce the emission of harmful gases, noise level and the number of traffic accidents [5].

The sustainable transport concept developed in the early nineties of the last century as a part of the sustainable development strategy. The sustainable transport definition that originated in the Canadian Centre for Sustainable Transport was almost completely accepted by the EU transport ministers as it is concrete, comprehensive, and follows the general principles of sustainable development set by the Bruntland Commission, namely: „Sustainable transport system enables individuals, companies and communities to satisfy their basic needs for access and development in a safe manner and in accordance with the health of citizens and ecosystems, and improves equality within the present and among the generations to come; it is available, it functions fairly and efficiently, offers the choice regarding the type of transport and ensures a competitive economy, as well as a well-balanced regional development; it limits emissions and waste quantity to the level which corresponds to the possibilities of the planet to absorb them, uses renewable resources to the level of their regeneration, and uses non-renewable resources to the level of the possibilities for the renewable substitute development at the same time minimizing the effects on soil overtaking and noise creation” [6].

The realization of actions at the local level is of paramount importance, for example, local self-managements can be economically motivated, as they become more attractive business areas with the decreased congestion and pollution. However, the ever increasing problems in the transport systems of European cities demanded special strategic documents, such as the Green Book entitled „Citizen Friendly Network” [7], and the Green Book entitled „Towards the New Culture for Urban Mobility” [8], which represent a framework for the sustainable transport development in cities and give directions for the operationalization of the sustainable mobility concept. Modern approaches to the solution of the herein stated problems can be found in the principles of sustainable transport which developed as a part of the sustainable development strategy. Therefore, what is needed is to define the sustainable transport development policy within a system, policy holders, plans, as well as the measures and activities that should be realized within each subsystem. Development and implementation of the sustainable transport development policy depends primarily on the degree of knowledge about the characteristics of sustainable mobility on the part of those in charge of defining and implementing the given policy in the transport system. Education is essential for improving the capacity of these people to address environmental and development issues, which are inextricably tied to sustainable development[9].

From the perspective of a complete system, education is an essential tool for achieving sustainability. People around the world recognize that current economic development trends are not sustainable and that public awareness, education, and training are key to moving society toward sustainability [10].

III. RESULTS AND DISCUSSION

The development, promotion and implementation of the sustainable urban transport policy to great extent depends on the devotion of the local government and its readiness for dedicated overall commitment toward its realization. In order to see the current situation in the local government in Nis, a professional opinion research, that is, local experts (35) who are, as a part of their daily business activities involved in the maintenance and construction of municipal infrastructure and the project management, was conducted as the first step.

An analysis of the existing conditions of the city transport system was conducted with the aim of establishing the directions for further research and implementation of sustainable types of transport in a system. A professional public opinion research was conducted on the conditions of the transport system through discussing the following transport system characteristics:

1. safety;
2. efficiency;
3. ecologicity;
4. accessibility;
5. economy.

The professionals dealing with the municipal problems were offered criteria whose importance was represented by a specific rank, that is, an absolute value. The absolute value of a criterium was determined based on the average mark of the criterium importance obtained based on the marks of all the participants in the poll, expressed on the scale from 1 to 10.

TABLE I
CRITERIA AIMED AT ASSESSING A TRANSPORT SYSTEM

| Ord. no | Criteria | Influence |
|---------|---|-----------|
| 1. | Safety – causalities, material damage, number of accidents | 9,0 |
| 2. | Efficiency – traffic congestion, time losses, moving speed | 8,8 |
| 3. | Ecologicity – air pollution, noise level, presence of vibrations | 8,6 |
| 4. | Accessibility – the use of the public transport vehicles, the use of passenger cars | 8,0 |
| 5. | Economy – tariff policy, savings in the transport system, rational transport solutions | 7,9 |

As shown by the previous researches into the characteristics of a city transport system, for example by the transport system planning study [11], one of the basic problems, especially in the central city area is a great number of conflicting situations between pedestrian and motorized transport. Naturally, what is needed is a complex analysis of the relations between sustainable types of transport and motorized flows, which has not been done in the researches of transport systems up till now.

Increasing the transport safety level for the „vulnerable” participants – pedestrians and cyclists, as a main prerequisite

of promoting more intensive walking and bicycle use for city travel is accompanied by a series of health effects. Radical changes in the urban lifestyle reflected in the shortage of free time, and excess of working and school time spent at the desk and a computer have, as a direct consequence, the lack of physical activity. The reduction in the use of motor vehicles is achieved by taking „soft measures”, such as: the use of various modes of communication, advertising, promoting and education with the aim of changing attitudes and actions in transport [12]. A more significant impact of sustainable mobility on a transport system is directly related to the knowledge about the basic characteristics, positive effects, as well as the advantages of the use of sustainable types of transport in the street and road traffic network, and having that in mind, the stated characteristics were examined on the sample of 140 subjects-professionals dealing with the project management and improvement of utility infrastructure within non-government organizations and in the city administration.

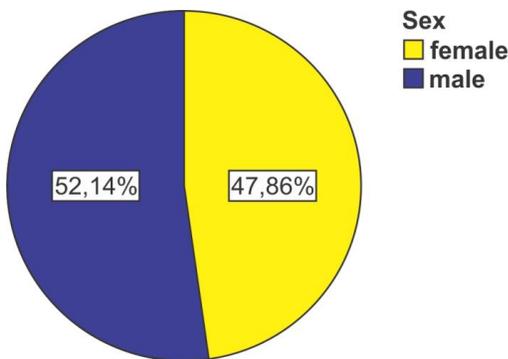


Fig. 1 Structure of subjects by sex

Figure 1 is a graphic presentation of the structure of subjects - of 140 subjects 52,14% were males, while 47,86% were females, which shows a considerable consistency between sexes.

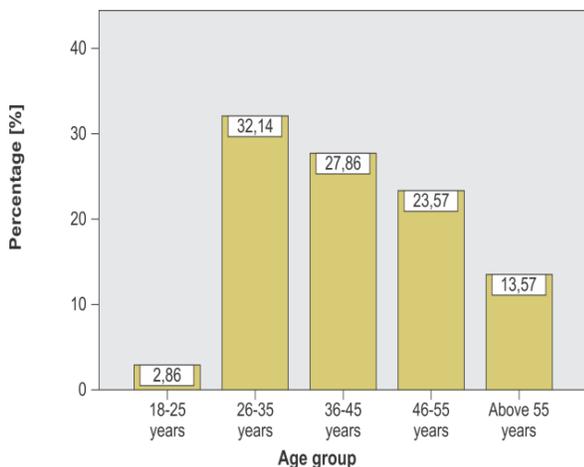


Fig. 2 Structure of Subjects - by age

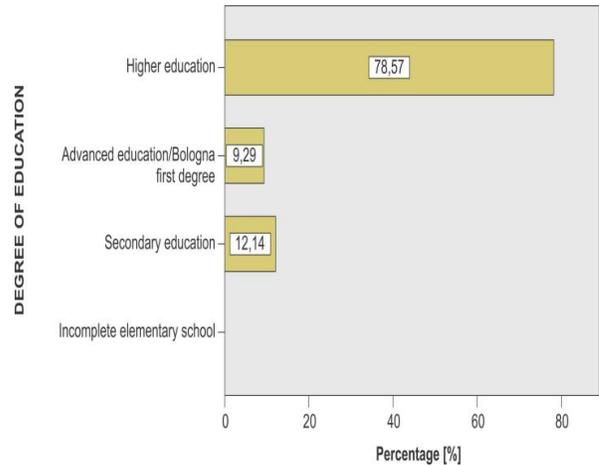


Fig. 3 Structure of subjects - by the degree of education

By analyzing the data presented in figure 2, it can be concluded that of 140 subjects, the greatest number 32,14% was aged 26-35, followed by 27,86% aged 36-45, then 23,57% aged 46-55, 13,57% aged above 55, and, finally polled, aged 18-25 with a share of 2,86%.

Based on the conducted statistical analysis it can be concluded that more than two thirds of those polled were with higher education, that is, have graduated from a faculty (78,57%). The members of non-government organizations and those employed in the City Administration who exclusively deal with project management have mostly graduated from a faculty. Of those polled, with secondary education were 12,14% , and with advanced education only 9,29%.

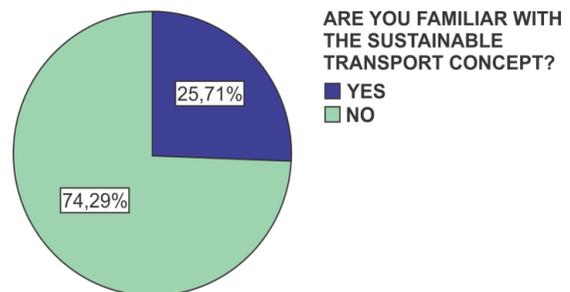


Fig. 4 - Presentation: Familiarity of the subjects with the sustainable transport concept

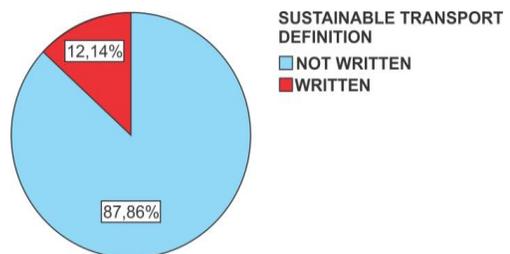


Fig. 5 - Presentation: Defining the sustainable transport concept

Of all those polled, 74,29% were not familiar with the sustainable transport concept, while 25,75% were. Furthermore, it can be concluded that 12,14% of those polled were familiar with the importance of sustainable transport,

even though those polled professionally deal with project management, and also, half of them are closely related to the management and improvement of utility infrastructure on the territory of the city of Nis.

Previous work on the familiarity with the sustainable transport definition has showed that „only“ 12,14% of those polled were familiar with the importance of sustainable transport, also, there is no statistically important difference between the sexes of those polled, since 84% of them did not define sustainable transport. The analysis of the influence of age on defining sustainable transport has shown no statistically significant difference, as more than 80% of those polled did not write a definition or positive characteristics of sustainable mobility. Similarly, the analysis of the influence of the degree of education on defining sustainable transport has shown no statistically important association, as 85% of those polled did not offer a satisfactory answer regarding the sustainable transport characteristics.

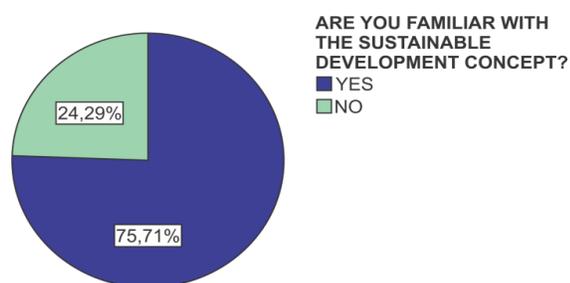


Fig. 6 - Presentation: Familiarity Of The Subjects With The Sustainable Development Concept

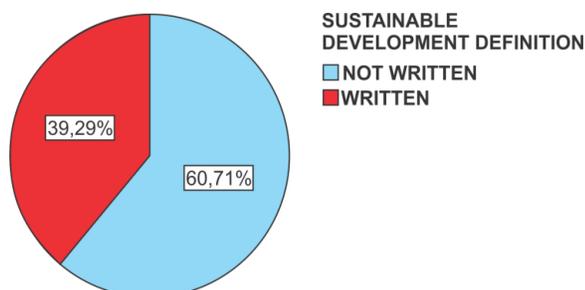


Fig. 7 - Presentation: Defining the sustainable development concept

Of the total number of those polled, two thirds, that is, 75,71% were familiar with the sustainable development concept. However, it can be concluded that in defining the sustainable development concept a positive answer was obtained from 39,29%, while 60,71% did not show sufficient knowledge about sustainable development. There is certainly a discrepancy between these data and the data from figure 4.a, which shows that 75,71% of those polled were familiar with the sustainable development concept.

IV. CONCLUSION

The number of motorists and traffic intensity have increased in bigger cities during the last twenty years. With the increased use of motor vehicle some adverse effects, such as traffic congestions, and a greater number of those killed in traffic accidents, noise, air pollution, faster warming and the

destruction of the ozone layer have also increased. Modern models in the solution of the stated problems have been developed on the basis of the sustainable transport principle which was developed as a part of the sustainable development strategy, including: the use of various means of communication, advertising, promotion and education with a view to changing attitudes and actions in traffic. The stated models are primarily based on good information and communication, organization and coordinated actions, and require corresponding promotion and media coverage. In order to achieve this, the local government has a crucial role.

However, based on the conducted research it can be concluded that there is little knowledge about the definition, importance and the characteristics of sustainable development and sustainable transport among the professionals dealing with the maintenance and improvement of utility infrastructure and the project management in the local self-management units. As the role of local self-managements is very important, as it is the level of government which is the closest to citizens, it is necessary to significantly improve the knowledge about the model, characteristics, as well as about the positive effects of sustainable development and sustainable transport among the responsible persons in the system. After that, it is necessary to undertake the stage realization of building and implementation of the sustainable development policy and sustainable urban mobility.

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