

Sustainable mobility as a result of peoples' awareness on environmental problems generated by transport activity

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Abstract. The field of mobility and transport has undergone major changes in recent decades, being a close link between it and the general economic development. Taking into consideration that urban areas concentrate the most of inhabitants and socio-economic activities, the negative effects generated by the increased road traffic are present mainly in the cities, especially in their central areas. People's involvement in awareness-raising actions on environmental issues caused by transport activity is a starting point for achieving a sustainable urban mobility system. Information and awareness of people about the link between travel behavior that they adopt and negative effects on the environment is a first step towards educating them in order to shift to sustainable mobility patterns. The paper highlights the awareness and participation component of people in the development and implementation of sustainable urban mobility plans, as an educational action for environmental protection and sustainable mobility. This concept of involving citizens is detailed within a case study.

1. Introduction

According to the latest statistical data, at the level of the European Union 70% of the population lives in the urban environment, which generates about 80% of the total GDP. These factors, in addition to the high usage levels of personal passenger vehicles powered by fuels from non-renewable sources have led to more difficulties in the smooth running of transport activities. One of the objectives of European Commission is to reduce the greenhouse gas emissions generated by the transport sector by 60% relative to the 1990 levels until 2050. Taking into account these target values and the travel characteristic of the urban environment – a high percentage of short-distance travels [1, 2], the cities/towns have a high potential of shifting towards a low carbon emission transport, which can be achieved through modal relocation, increasing pedestrian travel, travelling by public transport, using non-motorized means of transport or those means of transport powered by energy from renewable sources. Knowing that the three pillars which support sustainable development are the society, the environment and the economy, the citizens, as representatives of the society, play an important role in all the stages of the process of sustainable transport development – diagnosing the current situation, identifying solutions, devising development plans and implementing them. The effective involvement of the society in sustainable transport development is influenced by their knowledge of the field and the degree of understanding of the phenomena affecting the transport activities and the associated externalities [3, 4, 5], which can be achieved through environmental education.

Environmental education is the process by which individuals acquire knowledge and skills that help them become aware of and assess the negative effects caused to the environment by natural and anthropic activities. Thus, it brings about the determination and motivation for the participation of each individual and of the collectivity on the whole in solving the environmental problems of the locality in which they live. Environmental education also facilitates the decision making process ensuring certainty with regard to the effects on the environment and the adoption of responsible measures both at the individual and the community level. The higher the number of informed individuals, the greater the efficiency of promoting and achieving sustainable development goals. In Romania the ratio between the number of subjects that interacts with knowledge in educational environment the total population is very small. Subsequently, in addition to the educational means the population must be informed using seminars, workshops, brochures, leaflets, informative guides, etc.

Paper emphasizes the way in which the inhabitants of a Romanian town are involved in devising and implementing the sustainable urban mobility plan. The case study was conducted in Mioveni, the second town in Romania that started devising a sustainable urban mobility plan, document that entails the approach of participatory process in transport and sustainable mobility planning.

2. Methodology

The interaction between the transport system and the social, political and economic environment implies a complex interdisciplinary approach, which integrates aspects related to engineering, management, economy and last but not least, environmental protection. All these specific features contribute to the classification of the transport system as a large technical system. The specific spatial, temporal and structural features of the transport demand require a permanent adaptation of the offer and of the technologies involved to serve it, which makes transport become a very dynamic system. This dynamic character generates the difficulties encountered by the decision factors in transport planning. Their decisions have to ensure the effective running of the transport system with the lowest consumption of resources, minimum negative external effects and a degree of performance in conformity with the demand of the beneficiaries. Under these circumstances, the participation of the public in the decision making process in due time is essential for the success of any transport plan.

Kemp and Stephani presented 40 good practices in the field of transport planning; these were extracted from case studies conducted in 33 U.S. states and in 19 states from other continents. The following conclusion is underlined among the good practices suggested in the study: *"Planning and public participation are crucial ingredients to the success of a city's eco-transportation plan"* [6]. The idea was first brought into discussion by Sherry Arnstein in 1969. He represented the degree of citizen participation in the decision making process by analogy with the steps of a flight of stairs. The maximum power was reached by those participation typologies placed in the upper part: "partnership", "delegated power" and "citizen control" [7]. Booth and Richardson argue the need for public participation in transport planning in the UK, in the context of the institutional changes that took place in the late 1990s [8]. They propose a conceptual framework which integrates the aspects that must be taken into account when planning the public involvement plans in the field of transport planning, offering answers to the following questions: "Why involve the public?", "What is negotiable and what is non-negotiable?", "How will the public be involved?", "Who should be involved?", "When should the public be involved and where?".

The methodology proposed in this paper and meant to be used in the citizen education process, whose aim is to achieve sustainable transport, is based on public participation (citizens, representatives of the civil society (NGOs), representatives of public institutions) at all the stages of the sustainable urban mobility plan (figure 1): diagnosing the current situation; establishing the development goals, the course of action and the measures necessary for achieving the goals; action plan and its implementation, respectively.

The participation of the interested factors at all these stages allows them to collect information on the interdependence between the transport system and all the aspects of the socio-economic life.

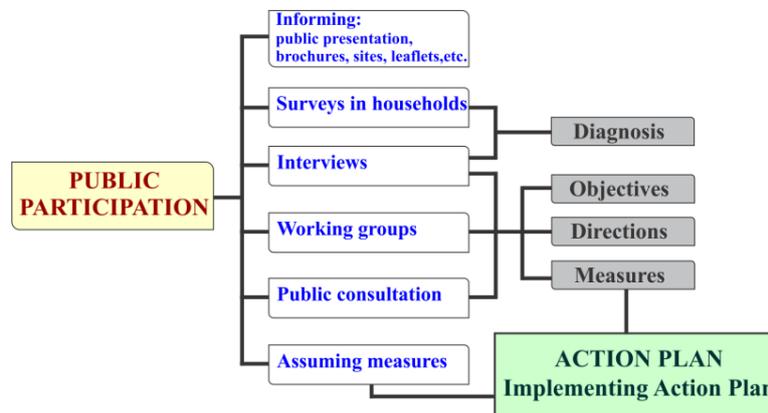


Figure 1. Public participation in devising the sustainable urban mobility plan.

Within the first part, dedicated to characterizing the current situation and diagnosing current mobility, the public is familiarized with the fact that the environment, economic prosperity, and social characteristics specific to a region depend on the transport system that serves the given/ respective territory and on its characteristics, such as: safety, accessibility, effectiveness, and impact on the environment (noise and air pollution, greenhouse gases). This stage represents the most consistent part of the plan, as a good substantiation for diagnosing mobility issues enables the realistic identification of the malfunctions in this field. In addition to the documenting process performed by the expert team, whose members come from interdisciplinary fields (transport engineering, urbanism, sociology, and economy), it is necessary to involve the citizens as a target group for surveys and interviews which will offer information about the mobility behaviour at the level of the area under study.

It is important to mention that in order to collect data more effectively it is necessary to promote these activities through all the media and to inform the people about the notion of "sustainable transport". Thus, it is recommended that through the environmental education provided within working groups and through public consultation to present/ explain the principles underlying the concept of sustainable transport – economy (saving of costs), social equity, environmental protection, which should be completed by the adequate institutional framework intended to support integration, transparency, assumption of responsibility, performance, effectiveness, long-term planning, international cooperation, innovation, best use of limited resources, and education.

Applying these principles knowledgeably to establish the objectives, the courses of action and the proposed measures will increase the effectiveness of the action plan implementation process by taking responsibility, an activity that can be regarded as a significant challenge taking into account the fact that the shift towards sustainable transport implies the adoption of some radical measures, with a major impact on all the users of the transport system.

3. Case study. Results and discussion

The case study in which the environmental education methodology in the field of transport was applied has been conducted within the sustainable urban mobility plan for city of Mioveni, a heavily industrialized Romanian town with high mobility values. The motorisation rate (number of passenger cars per 1,000 inhabitants) in the City of Mioveni was 33% higher than the average national value. Between 2009 and 2017, this indicator has grown from 220 to 350 cars / 1,000 inhabitants.

The participation of the population was materialized in informing activities, household surveys regarding the mobility behaviour, interviews with the main socio-economic factors operating in the area, working groups with the representatives of the public institutions, etc. The aim of these activities was to involve all the social entities in promoting sustainable mobility and environmental protection in a conscious manner.

The most complex action was that of identifying the mobility behaviour based on household surveys. The surveys were conducted for 567 persons from 200 households of the total of 11,164 recorded in the area, thus ensuring a representative sample of 1.8% [9]. The interview is divided into three main parts referring to: (i) general information on the size of the household, including the number of persons, passenger cars available, income level, etc.; (ii) specific information on each member of the household, such as the age, gender, occupation, whether or not they have a driving licence, workplace or place of study, etc.; (iii) specific information on the routes travelled by each member of the household the day before, in a 24-hour period. The information includes the origin and destination of travel, departure and arrival times, the mode of transport used, the purpose of travel, etc.

An indicator which is very important for analyzing the sustainability that results from these surveys is the modal distribution of travels (figure 2). The analysis of data shows a positive aspect, which is the fact that pedestrian travel accounts for 43% of the total travels.

The negative aspects are represented by the high percentage accounting for personal transport (car: 32%) and the low values reached by the collective means of transport (minibus: 11%, Bus - employee shuttle: 13%). Since pedestrian travel covers a significant percentage, another extensive action was the interviewing of the pedestrians regarding the existing facilities and those they would like to have at their disposal for non-motorized transport – the technical state of the infrastructure, the existence of pedestrian and bicycle tracks between the main points of interest, bicycle rentals, and accessibility. These interviews were conducted in the busy pedestrian areas (figure 3), on a sample of 500 people. As in the case of the household surveys, the first part of the discussion consisted of the introduction into the context of the study, each interviewee being given an informative brochure. After the data had been processed, it was found that 70% of the respondents would like to have bicycle lanes.

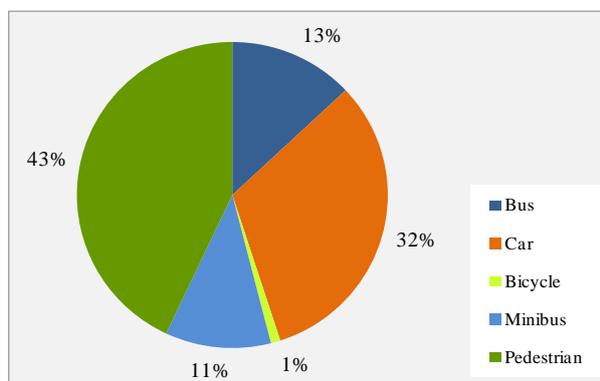


Figure 2. Modal distribution of travels.

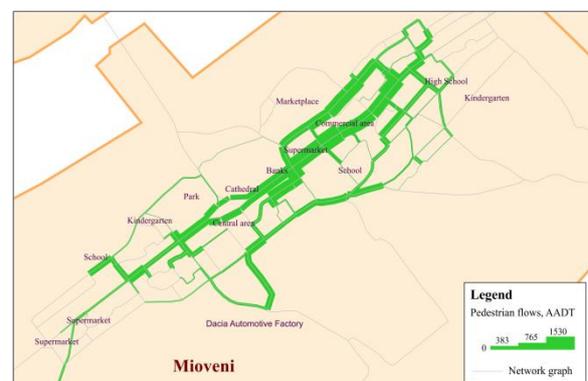


Figure 3. Pedestrian flows, Daily Traffic.

These topics, as well as other aspects related to the travel behaviour for working purposes were found in the survey forms distributed to the employees domiciled in the town of Mioveni and working in the main economic companies located in the area under study. A total of 542 persons were interviewed. The results obtained after processing the primary data reveal that most employees travel to their workplace on foot or by mass transport systems provided by the employer (buses – employee shuttles). All the distributed questionnaires were accompanied by informative brochures and instructions on how to fill them in. Furthermore, informative brochures were also distributed to groups of employees who were not part of the selected sample. This activity was performed with the help of the representatives of the companies involved in the action, who also participated in the working groups established for this purpose. The working groups were organized separately, for transport of people and transport of goods, respectively. Different organisations interacting directly with the two transport subsystems, both at local and county level were co-opted, thus creating a common framework which helped them identify the current internal mobility problems and find possible solutions to remedy and reduce them. The presentation of the conclusion reached by analyzing the data

from these surveys and from the documentation work on the current mobility situation conducted by the experts involved in designing the plan was made at the first public consultation, attended by 92 people (citizens, representatives of the civil society - NGOs, and mass-media). The second public consultation was meant to consolidate the proposed projects, taking into account the opinions of the public interested in this issue. 150 people attended the meeting, most of them belonging to that category of population with high levels of mobility (pupils/ university students) and persons with special needs (elderly persons). During the period in which the action was in progress, information relating to the project was published on the website of the local administration and informative materials were distributed among the people attending local events organized by the local administration (about 500 brochures).

4. Conclusions

The participation of all the interested parties in all the design stages of the sustainable urban mobility plan, first entails providing them with adequate information on the impact of the transport activity on the environment, which is a component of environmental education.

The current case study involved approximately 2000 people, which was a major effort, taking into account the fact that the participatory process in the field of transport planning in Romania is still at its initiation stage, because civic awareness is not properly developed. Once they were involved in this process, the citizens discovered that their opinion was important, investing feelings and intellectual capacity to propose and support those projects whose implementation should contribute to ensuring the sustainability of the transport system. This raised their awareness, which contributed to adapting the mobility behaviour of each citizen, so that their actions might minimize the negative effects on the environment. The agreement of the interested parties on the action plan creates the premise which supports the implementation stage of the plan, the stage in which the role of the concerned actors (citizens and organisations) is crucial for the acceptance of the proposed measures, as some of them involve the radical shift of the travel habits towards environmentally friendly means of transport – pedestrian and public transport, car-sharing, car-pooling and a reduction in the use of passenger cars. The education process based on participation in sustainable planning will continue in the stages monitoring the degree of the plan implementation.

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