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Problems involved in the development of instruments supporting the creation of sustainable behaviour in transport

Abstract. This article provides a discussion on the overall body of problems related to transport behaviours as well as the complexity of determinants conditioning the choice of the means of transport. Through these considerations, the author has made an attempt to assess both efficiency and legitimacy of certain instruments used for the sake of sustainable development of transport being a sector which, on one hand, constitutes an indispensable factor of socioeconomic growth, and on the other hand, causes numerous negative external effects reducing the general level of social welfare. The purpose of the article has been to highlight certain trends in the development of actions undertaken in order to build sustainable transport behaviours.

Key words: sustainable development of transport, transport behaviours, sustainable transport development tools, studies of ecological awareness among Polish drivers

1. Introduction

Unsustainable development of transport, which manifests itself in various phenomena, such as exhaust and greenhouse gas emission on an enormous scale, accidents, congestion, land occupancy, noise and vibrations[1] as well as a number

[1] The negative aspects related to the way in which the transport sector functions, burdening not only its users but also unrelated persons not directly involved in the transport activity, are referred to as negative external effects or external costs of transport. Similarly to the negative ones, also positive effects of transport apply to a relatively large number of phenomena. An example of those observed in the economic sphere may be the benefits resulting from market integration, e.g. in the Single European Market scale, increased mobility of production factors, work specialisation and division, wider selection of available products, whereas in the social sphere one

of other negative effects, triggers an increasingly urgent need for the changes taking place in this sector to be driven in such a manner as to enable drawing benefits from numerous advantages resulting from efficient transport systems, on one hand, but on the other hand, to reduce the aforementioned exemplary nuisances. For the sake of the importance of transport in light of developmental capacities of societies and economies, it was and still is extremely important in terms of the role it performs on various political stages: from the local to the global one. However, the nature of the said policies is subject to a more or less extensive transformations, and this is mainly due to the necessity of sustainable development of transport. Since road transport, including personal automotive transport, is responsible for a fair share of external costs of transport, leading to economic losses and reducing the level of social welfare, one of the trends being followed entails limitation of the use of private cars. Very diversified instruments are applied for this purpose, affecting different aspects driving the automotive industry as well as attitudes of transport users to a different extent, manifesting themselves in specific transport behaviours.

The purpose of this article is to determine the premises resulting from the complexity of determinants affecting transport behaviours among transport users with reference to building efficient sustainable transport development tools by limiting personal automotive transport. What has proved to be useful in this respect is the partial results of studies on the ecological awareness of Polish drivers conducted by the Ministry of Environment in 2010. In the first part of the article, the author has briefly discussed the main reasons for and symptoms of negative effects of the contemporary transport development trends as well as highlighted key features of sustainable transport and the tools assumed to enable it. In the next section of the article, the author has focused on describing transport behaviours perceived as ones which exert significant environmental impact, but also on their determinants. The subsequent paragraphs are mainly devoted to a discussion on the results of the ecological awareness studies conducted among Polish drivers as well as their analysis from the perspective of development and implementation of efficient tools promoting abandonment of personal automotive transport in favour of more environment and human--friendly means and modes of transport.

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should mention the improvement of the quality of life which manifests itself, for instance, through availability of public infrastructure, consumer goods or social exclusion prevention. These problems have been discussed more extensively by Fiedor (ed.) in a manual entitled *Podstawy ekonomii środowiska i zasobów naturalnych* (Wyd. C.H. Beck, Warszawa 2002, pp. 9-10). Negative external effects of transport, as they tend to intensify and bring up negative socioeconomic implications, have become subjects of numerous studies, concerning both the international scale (e.g. European Union, OECD), and the domestic one.

2. Reasons for limiting personal automotive transport

As already mentioned in the introduction, road transport is held responsible for a number of negative phenomena reducing the social welfare level and hampering the socioeconomic growth and development[2]. For example, not only does air pollution lead to subjectively experienced deterioration of the quality of life, but also causes respiratory tract illnesses or cardiovascular diseases consequently leading to premature demise[3]. About 93% of greenhouse gas emission in the European Union is caused by road transport[4]. It is also estimated that congestion, i.e. traffic jams, paralyses more than 7.5 thousand kilometres of European motorways every day, not to mention the issues it causes inside cities and agglomerations. In the EU, the congestion related costs (including time loss, excessive fuel consumption or increase car maintenance costs) are estimated to equal ca. 1% of GDP[5]. Moreover, in about 96%, transport depends on petroleum the global resources of which are rapidly shrinking[6]. From a global perspective, transport accounts for 61.5% of worldwide petroleum consumption (this share increased from 45.7% in 1973) and for nearly 1/5 of total energy consumption[7]. This issue does not only affect the matter of the natural capital preservation for future generations, but also applies to such aspects as energy security or sensitivity to oil crises, which considerably affects competitiveness and economic standing of countries or regions, including the European Union. For it generates strong stimuli to reduce the transport related energy consumption and to develop modes and means of transport which use other energy sources, including the renewable ones. One of the main trends observed

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[2] More about this subject in: *Handbook on Estimation of External Costs in the Transport Sector*, European Commission, DG TREN, Delft, 2008; S. Puławska, "Koszty zewnętrzne w polityce transportowej Unii Europejskiej", *Transport i Ochrona Środowiska* 2008, No. 5-6.

[3] According to the studies conducted by WHO and the European Union, air pollution in Europe causes 400 thousand premature deaths per year, and more than 100 thousand persons require profound hospitalisation due to lung diseases caused by emission of pollutants – "Czas oczyścić powietrze", *Przyroda dla Europejczyków*, Magazine of the General Directorate for Environment, http://ec.europa.eu/environment/news/efe/20/article_2434_pl.htm [27.12.2008].

[4] *Transport – znów ostatnie miejsce w klasyfikacji Kioto*, European Environment Agency 2011, http://www.eea.europa.eu/pl/pressroom/newsreleases/transport-2014-znow-ostatnie-miejsce-w-klasyfikacji-kioto [01.12.2012].

[5] *Impact Assessment. Accompanying document to the White Paper, Roadmap to a Single European Transport Area – Towards a Competitive and Resource Efficient Transport System*, European Commission 2011, COM(2011) 144 final.

[6] In the year 2010, about 1/3 of the total energy consumption in EU-27 accounted for transport, with more than 82% of this amount being attributed to road transport (*EU Transport in Figures. Statistical Pocketbook 2012*, European Union 2012, p. 116, http://ec.europa.eu/transport/facts-fundings/statistics/doc/2012/pocketbook2012.pdf [1.12.2012]).

[7] *Key World Energy Statistics 2012*, International Energy Agency, pp. 33, 37, http://www.iea.org/publications/freepublications/publication/kwes.pdf [31.01.2013].

in this respect is also the pursuit of behavioural change among transport users for the sake of personal automotive transport reduction. Since what accounts for a fair share of external costs of transport is the passenger transport. In the European Union, nearly 84% of passenger transport is attributed to private cars[8]. Although in the years 2000-2010 this ratio grew insignificantly (by 1%), within the years 1991-2010, the rate of population motorisation (number of private cars per 1,000 persons) increased from 334 to 473[9], which means that nearly half of Europeans own a car. Personal automotive transport is a predominant feature of urban centres and agglomerations where transport needs of various nature tend to intensify, but also where the negative impact of transport is the largest, on the other hand[10]. Not only does it involve the dynamically growing automotive sector, but also intense urbanisation processes observed all around the world, as nearly a half of mankind currently inhabits urbanised areas[11]. The economic and social role of urbanised areas in the development process is yet another factor which influences the high importance of sustainable development of transport (achieved through reduction of personal automotive transport, among other methods) in the hierarchies of political targets of many states, including the European Union countries[12].

3. General characteristics of sustainable transport and sustainable transport development tools

Like the very concept of sustainable development, so has the notion of sustainable transport (development) evolved. One may believe the starting point

[8] Entailing overland transport only, Eurostat data, http://appsso.eurostat.ec.europa.eu/nui/setupDownloads.do [1.12.2012]. Bearing all transport modes in mind, including air and water transport, this ratio increased to 74% in 2010, with the 2000-2010 demand for passenger car travel grew by 11% (60% in Poland) – *The Contribution of Transport to Air Quality. TERM 2012: Transport Indicators Tracking Progress Towards Environmental Targets in Europe*, EEA Report No. 10/2012, European Environment Agency, p. 302, http://www.eea.europa.eu/publications/transport-and-air-quality-term-2012 [2.12.2012]).

[9] Eurostat data, http://appsso.eurostat.ec.europa.eu/nui/setupDownloads.do [1.12.2012].

[10] For instance, ca. 69% of all road accidents take place in urbanised areas, and their casualties are predominantly pedestrians and bikers – Biała Księga, *Plan utworzenia jednolitego europejskiego obszaru transportu – dążenie do osiągnięcia konkurencyjnego i zasobooszczędnego systemu transportu*, KOM(2011) 144, final version, p. 9.

[11] *2007 World Population Data Sheet*, Population Reference Bureau, Washington 2008, http://www.prb.org/pdf07/07WPDS_Eng.pdf [31.01.2013].

[12] According to the EU estimates, by the year 2050, the lack of efforts in favour of more sustainable development of transport will have caused an increase of 1/3 in the CO_2 emission generated by this sector compared to the year 1990, an increase of a half in the congestion costs as well as a slight decrease in the transport dependence on petroleum to ca. 90% (Biała Księga, *Plan utworzenia*..., op. cit., p. 5).

of this process to have been the sustainable development definition as provided in the report entitled "Our Common Future", where it is described as a kind of development "that meets the needs of the present without compromising the ability of future generations to meet their own needs[13]". Initially, the largest emphasis was being put on the matters related to the issue of the natural resources depletion as well as the need for reducing anthropogenic pressure on the environment, whereas relatively lesser importance was attached to social issues[14]. However, this concept gradually started entailing more and more problems related to the self-sustaining (lasting) socioeconomic development being translated into different spheres of human life and activity. It was also reflected by the comprehension of sustainable transport, especially with regard to the extremely important role of this sector as well as the scale of its negative impact on the environment and men. In the 1990s, the notions of sustainable transport and transport system were put into a formal framework on the international level. And hence according to experts representing the European Commission, a sustainable transport system should be characterised by the following features[15]:

– it should ensure satisfaction of the need for access and development of individuals, enterprises and societies in a safe manner, not threatening the human life and ecosystems, and promoting equality between the present and future generations,

– it should be available in financial terms, function efficiently, provide optional transport modes to choose from and support dynamic development of the economy and the region,

– it should reduce harmful emissions and waste entailing the absorption capacity of our planet, utilise renewable resources on levels below their regeneration capacity, and the non-renewable ones on or below the level of their renewable substitutes, as well as minimise the occupancy and noise emission.

The first comprehensive definition of sustainable transport was proposed by OECD. It states that environmentally sustainable transport is "transport that does not endanger public health or ecosystems and meets needs for access consistent with: the use of renewable resources at below their rates of regeneration, and the use of non-renewable resources at below the rates of development of renewable

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[13] *"Our Common Future". Report of the World Commission on Environment and Development*, WCED, United Nations, 11th December 1987, http://www.un.org/documents/ga/res/42/ares 42-187.htm [31.01.2013].

[14] Meanwhile, these problems are extremely important, particularly from the perspective of development of sustainable transport systems which should provide mobility to all social groups, including disabled persons, elders or people facing the threat of social exclusion.

[15] *Defining an Environmentally Sustainable Transport System*, Commission Expert Group on Transport and Environment 2000, s. 5, http://www.ocs.polito.it/biblioteca/mobilita/Defining.pdf [31.01.2013].

substitutes[16]." Insofar as this concept mainly stresses energy saving, according to OECD, the primary purpose of sustainable transport is "maximally successful development of humankind based on solid economic, social and environmental foundations, for both the preset and the future generations[17]." Nowadays, in the broad scope of understanding of the notion, sustainable transport is assumed to support social and economic welfare on minimised negative impact on the environment, human health and life as well as the volume of natural resources. This concept has been described in Table 1.

Table 1. Characteristics of sustainable transport

	Sustainable transport
Environmentally	– functions in a safe manner, not threatening people or ecosystems, – reduces external costs due to emission of pollutants and CO_2, noise, congestion etc. relying on the planet's absorption capacity, – decreases energy consumption and land occupancy, – utilises renewable resources at below their regeneration rates, and the non-renewable ones on or below the development level of their renewable substitutes,
Economically	– contributes to dynamic general economic development of the region and growth of enterprises on simultaneous rationalisation of demand for (cargo and passenger) transport, – separates economic growth and development from growth in the volume passenger and cargo transport, – favours fair competition between individual transport modes, simultaneously promoting and developing those being the most friendly to people and natural environment, and between enterprises,
Socially	– considerably influences increasing of the quality of life, – ensures functional and financial accessibility, – provides a possibility to choose between optional modes of transport, simultaneously propagating sustainable behaviours among transport users, – favours development of individuals and societies, simultaneously ensuring rationalisation of demand for (cargo and passenger) transport, – ensures equality between present and future generations.

Source: M. Paradowska, *Rozwój zrównoważonych systemów transportowych polskich miast i aglomeracji w procesie integracji z Unią Europejską – przykład aglomeracji wrocławskiej*, Wyd. Uniwersytetu Opolskiego, Opole 2011, pp. 312-313.

Sustainable development of transport is not only characterised by multiplicity of goals, but also of the tools used to accomplish these goals. The urgent need for reducing negative external effects of transport, simultaneously gaining benefits

[16] *EST! Environmentally Sustainable Transport. Future, Strategies and Best Practices*, Synthesis Report of the OECD project on Environmentally Sustainable Transport EST presented on occasion of the International *est!* Conference, Vienna, 4th to 6th October 2000, p. 35.

[17] *Polityka transportowa państwa na lata 2001-2015 dla zrównoważonego rozwoju kraju*, Ministerstwo Infrastruktury, Warszawa 2001.

from positive effects, has born the fruit of solutions of diversified nature emerging in nearly all spheres: infrastructure, administration, economy and market, information and education, logistics etc. Some examples of tools used for the sake of sustainable transport development have been described in Table 2.

Table 2. Review of sustainable transport tools

Tool category	Examples
Economic and market related	– internalization of external costs of transport, – other kinds of taxes and charges related to transport activity,
Legal and administrative	– legal regulations (e.g. traffic regulations, safety standards), – administrative orders (e.g. limited traffic zones, car entry prohibitions),
Infrastructural	– extension, redevelopment and upgrading of infrastructure, – infrastructural enhancements (e.g. noise barriers, speed bumps, park&ride systems, isolated railway tracks and bus lanes etc.),
Technical and technological	– technological innovations related to infrastructure or means of transport (e.g. smart transport systems, noise suppressing engine covers, alternative fuel propelled driving systems, ecological cars etc.),
Moral and information-educational	– educational campaigns and information promoting transport behaviour shift (e.g. commercials, eco-driving education etc.), – promotion of sustainable mobility (e.g. sustainable mobility week, car-sharing etc.),
Miscellaneous	– spatial planning, – working mode shift (work at home), – logistic solutions (e.g. logistics centres), etc.

Source: J. Platje, M. Paradowska, *Zarządzanie kryzysowe w przedsiębiorstwie transportowym*, Wyd. Nasz Dom i Ogród "Flora", Wrocław 2011, p. 180.

In the most general understanding of the fundamental channel of actions, it is a change in the transport mode structure in favour of more extensive use of environment and human-friendly modes and means. Consequently, what appears to be particularly important in light of the problems discussed in this article is the reduction of private automotive transport. Such tools as infrastructural enhancements or technological innovations in vehicle design will matter to a lesser extent in this context, whereas those that will matter more are tools targeting a shift in the transport behaviours among private car users or sustaining transport behaviours among persons who choose (for various reasons, just to mention the economic ones) public transport, walking or bicycling. It should also be noted that all these goals can be attained in various ways, applying both 'hard' and 'soft' tools[18]. An

[18] The 'hard' measures are referred to as "efforts undertaken by decision makers targeting behaviour shift, which consist in applying specific taxes and charges, rules and regulations as well as infrastructural solutions". On the other hand, the 'soft' measures comprise other categories

economic and market tool of major significance, namely internalisation[19] of external costs of transport, may be perceived as a 'hard' measure, since its purpose is to discourage people from using private cars by means of various financial stimuli. On the other hand, organising different kinds of information and publicity campaigns, for instance to promote bicycle as the transport means of choice in cities, should be qualified as 'soft' tools.

One may question the reasons for distinguishing between the two said categories of tools, since both are envisaged to serve the purposes of the transport behaviour change. However, not only the distinctiveness of the solutions applied but also several other aspects substantiate this division. First of all, one should indicate the level of costs which must be mobilised in the development of individual tools as well as their implementation. The 'hard' measures usually require far higher costs to be incurred compared to the 'soft' ones. This can be associated with efficiency of individual tools, since both these factors condition the cost effectiveness of each solution, and consequently also the degree of simplicity or even feasibility of their actual implementation. For instance, introducing a toll collection system at entrances to a separated city zone may involve enormous initial investment expenditures as well as system maintenance costs, but also exert a considerable impact on persons willing to move inside such a restricted zone and ultimately giving up their cars. Consequently, despite the necessity to incur very large costs, the tool will be characterised by relatively high efficiency. On the other hand, education and information campaigns involve smaller costs to be incurred, but also their efficiency is usually lower, which is then translated into a low or a moderate cost effectiveness ratio[20]. It should also be noted that the cost level and effectiveness may differ across indi-

of efforts undertaken by decision makers, including primarily information campaigns or using positive and negative associations (to indicate the positive nature of travelling by bicycle or diverse negative effects of car driving) – *Soft Measures and Transport Behaviour*, EST, OECD, Berlin 2002, p. 3, http://www.oecd.org/env/transportandenvironment/16199621.pdf [31.01.2013].

[19] Internalisation means putting the actual costs of activity of a certain entity or person on account of the said entity's or person's costs, including private costs as well as external costs incurred by the entire society. In the case of private transport users, it would consist in including all their costs, such as air pollution charges, land occupancy charges (which is actually reflected in parking fees more and more often) or the congestion input etc.

[20] Opinions vary in this respect. There are studies implying very high cost effectiveness of 'soft' sustainable transport development tools, and numerous scholars concur with this standpoint (more on this subject at: *Project on Environmentally Sustainable Transport (EST). Report on the OECD Conference Environmentally Sustainable Transport (EST): Futures, Strategies and Best Practice*, OECD, Vienna 2000, http://esteast.unep.ch/phocadownload/oecd0003.pdf [31.01.2013]; *Soft Measures and Transport Behaviour...*, op. cit.). This should be associated with the fact that the 'soft' measures are frequently focused on the ecological awareness building, and hence they help develop long-term sustainable attitudes and behaviours, which has also been discussed later in the article.

vidual countries or even regions, and that it depends on an multitude of causes, e.g. mindsets and social cultures, the current level of development of transport systems etc.

The amount of expenditures and direct efficiency are not the only aspects conditioning the discrepancies between 'hard' and 'soft' sustainable transport development tools. What seems equally important is that they affect different motives behind individual transport behaviours, this to be discussed in detail in the next section. Another significant factors are also the time horizon of the expected outcomes as well as indirect socioeconomic effects of individual solutions. For instance, an administrative tool which consists in a car use prohibition will indeed bring the expected results (i.e. reduction of personal automotive transport) in a fairly short time, limiting the level of negative external effects of transport. However, having gone deeper in the analysis of consequences of such a solution, one may draw a conclusion that it does not in fact build sustainable transport behaviours, since people *have to*, and not necessarily *want to* renounce car driving, and they may not agree with the rationale behind the solution, having an impression that they have been treated unjustly. Such a situation lacks social and individual acceptance[21] for the prohibition, and what follows is the growing opposition towards the decision makers responsible for the implementation of the measure which, in a longer perspective, may even lead to the car use permission reinstatement. Moreover, depending on the access to alternative means of transport, this prohibition may also bear other negative effects of social nature, e.g. contributing to social exclusion of certain groups (disabled, elderly, sick people), or even economic nature, e.g. reduced accessibility of service and trade facilities for many people, consequently leading to shrinkage of the outlet market of the goods and services these facilities deliver.

The aforementioned problems involved in developing and implementing sustainable transport tools as well as related to their characteristics imply that changing transport behaviours of individuals, including reduction of the passenger car use, is a complex notion which requires an appropriate and well considered set of tools. It entails many aspects, including the fact that the behaviours are ultimately influenced by a number of different stimuli, which actually condition the efficiency of individual solutions not only from the perspective of direct and short-term outcomes, but also of building lasting and sustainable consumption models in transport. All these problems have been elaborated upon in the next section.

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[21] More can be read about social acceptance of solutions supporting sustainable development in such publications as: M. Paradowska, "Akceptacja publiczna jako element kształtowania zrównoważonych systemów transportu w miastach", *Handel Wewnętrzny* 2012, Vol. 3, pp. 228-239.

4. Transport behaviours and their determinants

Transport activity, and mainly use of private cars, is among the behaviours having the most considerable impact on the environment[22]. Although individual decisions and behaviours seem to have a limited influence on the emergence and impact of negative external effects of transport, however, their mass nature and frequency are the key issues in this respect. This may imply that those who use private means of transport and justify their transport behaviours claiming that they have practically no effect upon the reduction of the negative transport impact, even if they should give up car driving, are wrong. Also supporters, activists or decision makers actively involved in the creation of sustainable transport behaviours argue that a shift in every single person's behaviour does matter[23].

Transport behaviours may be considered as consumer behaviours of men related to satisfaction of transport needs. Authors interested in this subject more and more frequently study and describe the behaviours exerting significant environmental impact, their determinants, orientation options as well as specificity, depending on the needs or actions these behaviours concern[24]. What seems to be growing in importance from the perspective of the problems discussed in this article, related to behaviours of drivers and the necessity to reduce private automotive transport in favour of sustainable development of transport, is the matter of transport behaviour determinants conditioning the choice of the means (mode) of transport, including the motivation to renounce private car driving.

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[22] Most generally speaking, a consumer behaviour may be defined as the "overall body of activities related to acquiring, using and disposing of products and services along with decisions preceding and conditioning these activities. They include purchasing, owning and using means to satisfy needs" (M. Karczewska, "Determinanty zachowań konsumenckich na rynku", in: *Materials of the 2010 Krakow Conference of Young Scientists. Symposia and Conferences of the Krakow Conference of Young Scientists*, No. 5, Pro Futuro Scientific Group, AGH University of Science and Technology in Krakow, Kraków 2010, http://www.profuturo.agh.edu.pl/pliki/Referaty_V_KKMU/NE/r475-484_Karczewska.pdf [31.01.2013]). Meanwhile, the behaviours exerting significant environmental impact are all those consumer behaviours which bear considerable negative impact on the environment (more about the subject at: *Zrównoważona konsumpcja i produkcja. Środowisko Europy. Czwarty Raport Oceny*, Report No. 1/2007, European Environment Agency, 2007, pp. 256-258, http://www.eea.europa.eu/pl/publications/srodowisko-europy-2014-czwarty--raport-oceny [3.12.2012]; P.C. Stern, "Toward a coherent theory of environmentally significant behavior", *Journal of Social Issues* 2000, No. 56(3), pp. 407-424).

[23] Information provided by Prof. Udo Becker (Dresden University of Technology, Germany) at a training session on mobility management organised under the "Transport Learning" cycle; Krakow, 24th January 2013.

[24] See also: P.C. Stern, "Information, incentives, and proenvironmental consumer behavior", *Journal of Consumer Policy* 1999, No. 22, pp. 461-478; P.C. Stern, "Toward a coherent theory…", op. cit.; P.C. Stern, "Understanding individuals' environmentally significant behavior", *Environmental Law Review* 2005, No. 11(35), pp. 1078-1079.

There are numerous different stimuli affecting consumer behaviours of men. Trying to enclose them in a systematic framework, one may distinguish between specific fairly uniform groups of determinants: economic and market related, psychological as well as sociocultural[25]. Obviously, within each of these groups, one may speak of further subgroups, such as financial determinants, specificity and properties of transport needs, stimuli assuming the form of legal and administrative regulations, social consumption patterns, ecological motivations etc.

The most important transport behaviour determinants among the economic and market related conditions are transport needs[26], followed by prices of transport services or costs related to individual means of transport. Transport needs originate at diverse sources as they may stem from the necessity to travel to work or school, do shopping, or from informal social motives. It matters at least for several reasons. Firstly, the nature (source) of the given need affects the expected quality of its outcome (satisfaction), i.e. transport requirements, as they are referred to: reliability, cost, punctuality, promptness and directness of travel etc.[27] Their hierarchy may vary, and not only due to the nature of the given need and its origin, but also depending on subjective expectations of individual persons. For instance, persons travelling to work may attach greater importance to promptness and punctuality rather than to travel costs. This, in turn, may condition the efficiency of certain solutions applied in favour of sustainable development of transport. The efforts targeting improvement of travelling comfort of public means of transport, when timetables are not traveller-friendly themselves, for instance from the perspective of the connection frequency, and do not guarantee quick and punctual transport to workplaces, may prove to be inefficient.

Travelling costs, also constituting one of the transport requirements, are yet another determinant of transport users' behaviours. However, it turns out that – with regard to private automotive transport – costs are less important in the hierarchy of requirements[28], which is also reflected by the relatively poor price

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[25] Compare e.g.: G. Antonides, W.F. van Raaij, *Zachowanie konsumenta*, PWN, Warszawa 2003; M. Karczewska, op. cit.; A. Jachnis, *Psychologia konsumenta. Psychologiczne i socjologiczne uwarunkowania zachowań konsumenckich*, Oficyna Wydawnicza Branta, Bydgoszcz 2007.

[26] A transport need has been defined by Rydzkowski and Wojewódzka-Król as a "potential need distinguishable from others, reported by the economy and the society, to transport persons, goods and messages in a given time for a given distance" (*Transport*, eds. W. Rydzkowski, K. Wojewódzka-Król, PWN, Warszawa 2007, p. 26).

[27] S. Marszałek, *Ekonomika, organizacja i zarządzanie w transporcie*, Wyd. Śląskiej Wyższej Szkoły Zarządzania, Katowice 2001, p. 85.

[28] It seems – and studies conducted among Polish drivers confirm it – that the key role is in this respect played by convenience, feeling of privacy and independence while organising the travel and actually travelling.

flexibility of transport demand[29]. The fact that no major trend of private car use renouncement has been observed within the recent years, despite the considerable increase of car operation and maintenance costs, should be associated with the internalisation of external costs being one of the sustainable transport development tools most frequently postulated in the European Union[30]. Since private car users respond to price increases poorly, the internalisation will probably also prove inefficient in discouraging them from using their own means of transport. On the other hand, it may contribute to an increase of proceeds to the government or self-government budgets (depending on the solutions adopted) which may be subsequently allocated to development and implementation of other solutions[31].

It should also be observed that, besides transport requirements, the price flexibility of demand is affected by a number of other factors. One may also find car travelling to have numerous substitutes, since there is a choice between potential options such as public transport, bicycle, hitching a lift etc. However, for most advocates and followers (especially long-standing ones) of private automotive transport, they are hardly close substitutes. Hence despite the economic nature of the determinant in question as well as the tool addressing it, namely the internalisation, transport behaviour will not be altered, since drivers will not consider public transport as a real alternative because of various reasons, including heavy impact of other stimuli and motives, such as the habit, the mindset (not allowing oneself to even consider using other means of transport), patterns disseminated by the society (e.g. "he can afford a car, so he is rich"). On smaller price flexibility, abandoning the decision to purchase a specific commodity is usually connected with a certain price level. Therefore, one may assume that a certain 'prohibitive' price level would actually convince the most declared users of private cars to change the manner in which they are to move, and ultimately shift to a more environment-friendly mode, since they would simply be incapable of covering the car travel costs. However, there is one

[29] For instance, in the years 2005-2012, prices of petrol, diesel oil and LPG in EU-27 rose by more than 50% (*Oil Bulletin. History from 2005 Onwards*, European Communities 2011, http://ec.europa.eu/energy/observatory/oil/bulletin_en.htm [5.12.2012]). However, by no means did it reduce the use of cars among citizens of the EU countries. From 2005 to 2010, the number of passenger cars registered in the EU-27 increased by ca. 8.6%, and the volume of car travels (expressed in passenger-kilometres) by more than 4% (*EU Transport in Figures. Statistical Pocketbook 2012*, European Union 2012, http://ec.europa.eu/transport/facts-fundings/statistics/doc/2012/pocketbook 2012.pdf [1.12.2012]).

[30] See also: Communication from the Commission to the European Parliament, the Council, the European Social and Economic Committee and the Committee of the Regions, *Europa efektywnie korzystająca z zasobów – inicjatywa przewodnia strategii "Europa 2020"*, KOM(2011) 21, final version; Biała Księga, *Plan utworzenia*..., op. cit.

[31] In this respect, the internalisation of external costs of transport resembles excise tax imposed upon alcohol and tobacco products.

more question left unanswered, namely to what extent such a shift would actually involve sustainable development of transport? The direct outcomes assuming the form of a decrease in the number of cars running the roads would certainly be noticeable. But perhaps some persons would be anxious about it, or even – when no suitable alterative is offered to them (e.g. public transport matching the needs of the disabled) – would have no possibility to travel otherwise.

The foregoing considerations are not to be perceived as an argument against internalisation being an efficient and/or needed tool of sustainable transport development. They may, however, suggest that this tool does not provide the expected and most desired outcomes from a comprehensive, holistic point of view. This may be the case because it is focused on one of the transport behaviour determinants, whereas it may well conflict with others. At this point of the analysis, one should refer to the research conclusions drawn by Stern[32]. He has observed that, from the perspective of pro-ecological shift of consumer behaviours, the most effective solutions are those which combine actions addressing different kinds of motives conditioning the given mode of behaviour. Stern argues that tools referring to a single determinant type only are often inefficient, because they do not remove the barriers hindering the behavioural shift which result from other determinants. Based on these conclusions, one may claim that internalisation should be combined with some other measures, for instance, with campaigns promoting alternative means of transport or informing the public of how to use public transport, as well as with improvement of the public transport functional efficiency etc. It seems to confirm the significance and the need for application of the 'soft' sustainable transport development tools, as many of them refer directly to psychological (e.g. personal traits, value systems, learning process, habits and customs or lifestyle followed) and sociocultural (e.g. influence of the family, social groups and leaders) conditions of transport behaviours.

Drawing from the arguments proposed by Stern, one may claim that private automotive transport users can be and predominantly are exposed to a specific cognitive dissonance. On one hand, a car satisfies their transport needs in the best possible manner, for a majority of the society uses private automotive transport, the media promote a positive image of private cars as goods ensuring the sense of freedom and independence, providing prestige, and the road infrastructure is the best developed system ensuring access to virtually any location of choice etc. On the other hand, car users start being encumbered with various restrictions, such as entry prohibitions or additional charges, various groups (environmentalists, decision makers) indicate the harmfulness of private cars, whereas the media – next to attractive car commercials – show cars in explicitly unfavourable light. Therefore, it seems that, besides

[32] P.C. Stern, "Toward a coherent theory…", op. cit., pp. 419-420.

developing solutions to promote sustainable transport behaviours, that would exert comprehensive influence on different types of determinants, one should also minimise various impacts disseminating unsustainable behaviours. However, it is not easy to explicitly determine which of these tasks is indeed more difficult.

The cognitive dissonance resulting from diversified stimuli being sent from the surrounding may contribute to the lack of acceptance of sustainable transport development solutions, thus hindering the promotion of lasting and sustainable transport behaviours and systems. While considering this matter, one should also refer to the studies by Platje, who has made a reference to new institutional economics trying to convince the public that changing formal institutions (which, in the case of sustainable development of transport, would involve e.g. changing the legal and administrative framework by introducing restrictions for car users) should proceed along with supporting changes in informal institutions (i.e. social standards, value systems etc., for instance those targeting more environment and human-friendly modes of transport)[33]. Otherwise, changes occurring in the formal institutions may encounter opposition from the society, and hence they are not to be respected, which will make it impossible to follow the path of sustainable development.

In this respect, one should also refer to the difference between internal and external motivation elaborated upon by Coada, Haanb and Wörsdorfer[34]. Addressing the external motivation only, for instance, by imposing charges on emission of car exhaust gases (internalisation of external costs of transport), may weaken the internal motivation, one which assumes the form of genuine care for the environment, since by being forced to pay such charges, one may feel 'justified' to continue the emission and will not be inclined towards its discontinuance, e.g. by switching to different means of transport. And hence in this particular case, the given sustainable transport development tool does not actually build lasting and sustainable transport behaviours as well.

5. Ecological awareness of Polish drivers with reference to the transport behaviour change

The problems pertaining to a change pursued in the transport behaviour of private automotive transport users for the sake of sustainable development of

[33] See also: J. Platje, *Institutional Capital – Creating Capacity and Capabilities for Sustainable Development*, Wyd. Uniwersytetu Opolskiego, Opole 2011.

[34] A. Coada, P. de Haanb, J.S. Wörsdorfer, *The Role of Knowledge, Incentives and Consumption Behavior in Environmental Innovations: An Application to Car Purchases*, DIME Workshop "Empirical Analyses of Environmental Innovations", Karlsruhe 2008, http://www.dime-eu.org/files/active/0/ISIWorkshopCoad.pdf [5.12.2012].

transport, as briefly discussed above, may be applied to analyse results of studies conducted in June 2010 among Polish drivers in the age from 18 to 64 years, in towns, as commissioned by the Ministry of Environment[35].

First of all, it seems interesting that a car is mainly driven on weekdays by Polish transport users for the purpose of travel as well as in order to get to and from work (17%), for shopping purposes (8-9%), with the former being dominated by both short (up to 5 km) and long distances, whereas the second category predominantly covered short distances[36]. This can be associated with the degree of obligatoriness of the transport need and the resulting quality of travel in demand, but also with the fact that people using private means of transport are usually employed (this may be traced back to the necessity of providing for the car maintenance and incurring travel costs), whereas the route to and from the workplace is usually taken on weekdays. Weekends were dominated by driving for shopping (11-12%) and social (9%) purposes. It implies that, for persons who drive a passenger car, this becomes the main, and often the only means of transport they use[37]. On the other hand, driving a car to go shopping may be also associated with the functional and spatial arrangement developed in most cities, with an important role of commercial centres and the related lifestyle based on private automotive transport.

From the perspective of the foregoing analysis of determinants for transport behaviours, also the following study results provided in the Ministry's report must be considered important: (1) although the level of private automotive transport use in everyday travelling differed depending on the income amount, still the difference in question was smaller than the corresponding difference in the income itself (81% of all travels in a household attaining income of up to PLN 700 per person and 88% in a household attaining income of more than PLN 2,000 per person); (2) more than a half of those surveyed usually tanked 95 octane petrol, every fourth person ran on diesel oil and every seventh – on LPG[38]; (3) the main

[35] Results of the study have been discussed in the following report: *Monitorowanie postaw społecznych w zakresie zrównoważonego transportu. Pierwszy etap badania*, a report developed under a commission of the Ministry of Environment, PBS DGA Sp. z o.o., Sopot 2010, http://www.mos.gov.pl/g2/big/2010_12/7b2301bd6c0c4c7a4013ca88560e1558.pdf [31.01.2013].

[36] *Monitorowanie postaw...*, op. cit., p. 17.

[37] According to the studies, car is used in ca. 87% by Polish drivers' households (*Monitorowanie postaw...*, op. cit., p. 18). Experience shows that it is much easier, for instance, to retain a passenger of the public transport than to persuade a person using their own car to switch to public transport.

[38] Whereas in the years 2004-2013, retail prices of these fuels, for instance, in the Silesian region in Poland, increased follows: for the Pb95 petrol, from ca. 3.6 to 5.5 PLN/l (i.e. nearly by 53%), for ON from ca. 3 to 5.5 PLN/l (i.e. nearly by 83%), for LPG from ca. 1.6 to ca. 2.75 PLN/l (nearly by 72%) (M. Rolka, *Paliwa – detaliczne ceny na stacjach paliw od 20.03.2004 do 29.11.2012*, http://mrc.tychy.pl/ceny.paliw/ [5.12.2012]). Meanwhile, the motorisation coefficient grew in Poland from 323 to 451 vehicles for 1,000 inhabitants.

incentives to use a private car included convenience (70%) followed by travelling time (47%); (4) poor technical condition of roads (52%) and traffic congestion (46%) were considered by drivers to be a more serious issue than car maintenance and service costs, including fuel prices (41%); (5) drivers used alternative means of transport to a small extent (walking – 7% of those surveyed, bus – 5%, tram – 2%, bicycle – 2%); (6) drivers were willing to renounce driving a car in favour or other means, such as public transport, to a different extent, however, 27% of those surveyed claimed that they would not quit using private automotive transport at all; (7) drivers displayed different degrees of acceptance and susceptibility to the sustainable transport development tools proposed[39].

Based on the survey results, one may reach a conclusion that Polish drivers are also characterised by weak price flexibility of demand for private automotive transport, since, on one hand, they would travel by car regardless of the income level, and on the other hand, they would not even become willing to renounce their cars by considerable fuel price increases. Moreover, average monthly expenses incurred on car maintenance slightly exceeded PLN 430[40]. At the same time, those surveyed did not support such economic tools as, for instance, charges on downtown driving (63% of respondents) or making all parking spaces in city centres paid (61% of respondents)[41]. These results seem to conform with the lack of acceptance for internalisation, as previously suggested by the author, which may be directly translated into the solution's efficiency. They also appear to support a hypothesis that, insofar as public transport constitutes an alternative for a private car, it may not necessarily be perceived by drivers as a close substitute of private automotive transport, all the more since, according to the studies discussed, convenience was the decisive factor when choosing the means to commute (70%), whereas low travelling comfort (39%) and crowd (36%) were the main reasons for which drivers were not inclined to use public transport. The foregoing implies a considerable importance of psychological conditions of transport behaviours. Bearing these circumstances in mind, one might think that improvement of quality and comfort of public transport could induce some change in the transport behaviours of individuals. However, also in this respect, the probable actual outcomes of such efforts may prove negligible, since a car is in fact the only means of transport ensuring the sense of intimacy, privacy and independence.

What is also interesting about the study is the public transport barriers mentioned by those surveyed, namely the complications involved in ticket buying and the impossibility to reach the point of destination. A person who does not

[39] *Monitorowanie postaw*..., op. cit., pp. 31, 33, 38, 48, 51, 60-85.
[40] Ibidem, p. 5.
[41] Ibidem, pp. 72-75.

travel by bus or tram on everyday basis may face serious problems due to insufficient information on which line to choose in order to get to the indented location, where to buy the ticket or at which stop to get off. For these reasons, the provision of information on public transport plays a significant role and may indeed be an important argument for the use of 'soft' sustainable transport development tools. Nevertheless, despite the fact that Polish drivers did notice the benefits resulting from the private car renouncement (mainly health related – 57% and financial – 41%), still as many as 27% of those surveyed declared that no benefits would persuade them to give up private automotive transport. This strong conviction and declaration is most probably due to psychological determinants, and hence all efforts targeting sustainable development of transport should entail instruments addressing these conditions of transport behaviours, even if the very activities undertaken primarily consist in introducing fees or regulations.

The final part of the study conducted by the Ministry was envisaged to verify the level of familiarity with campaigns known as the *European Sustainable Transport Week* and the *Car-Free Day*[42]. Although 64% of those surveyed admitted being familiar with the European *Car-Free Day* initiative (for comparison, only 6% heard about the *European Sustainable Transport Week*), 61% claimed that there should be more such campaigns, and 63% stressed the importance of sustainable transport education for drivers, still nearly 49% responded that no campaign would convince them to renounce car driving. This may suggest that many statements of those surveyed were merely of declarative nature, whereas in the reality, the respondents were not willing to voluntarily switch from private cars to more environmentally friendly modes of transport. This, in turn, may substantiate application of more compulsory tools, e.g. economic (internalisation) or administrative and legal (car entry prohibitions etc.) solutions, and explain why these tools are the most popular ones when direct effects are to be attained in a short period of time. However, as the author has indicated on numerous occasions in this article, the 'soft' sustainable transport development tools still play a very important role, since they affect various psychological and sociocultural determinants of transport behaviours, thus conditioning the creation of actual (and not only coerced) sustainable behaviours.

[42] The initiative was originated in 2002 by the European Commission and 19 other international organisations involved. Its main purpose is to encourage local authorities to promote sustainable mobility among inhabitants of municipalities and agglomerations, raising civic awareness in this respect and altering consumer behaviours, predominantly by reducing private automotive transport and disseminating the collective transport concept. The initiative is renewed yearly in September, http://www.mobilityweek.eu/ [1.12.2013].

6. Conclusions

The considerations provided in this article as well as the brief analysis of results of the Polish driver's ecological awareness study imply several conclusions valuable from the perspective of tools developed for the sake of more sustainable development of transport.

In the first instance, as repeatedly emphasised in the literature of the subject, one should stress the need for comprehensive tools affecting various conditions of transport behaviours among supporters of private automotive transport. Otherwise, even if the expected outcomes were achieved, inducing the renouncement of passenger cars, some negative socioeconomic consequences may still occur, and at the same time, no actual and lasting attitudes and behaviours conforming with the sustainable development idea would be built. For this reason, what seems to be particularly growing in importance is the combination of 'hard' and 'soft' tools. Discouraging people from driving private cars by applying financial or administrative barriers exclusively may trigger social opposition and aversion towards sustainable solutions, which by itself contradicts the prerequisites of sustainable development. Therefore, it is important to apply a number of positive stimuli affecting psychological or cultural factors. It is nor an easy task, especially since car users, even despite being in favour of and supporting such positive stimuli, are not at all willing to quit driving private cars under their influence.

In order to build sustainable transport behaviours lasting for longer, not only should the shift in the drivers' behaviours be addressed, but also appropriate attitudes created and ecological awareness of the young generation built, thus ensuring that current users of public transport are retained and satisfying persons travelling on foot or by bicycle. This extends the level of complexity of the sustainable transport development tools, but also conforms with the arguments provided in this article. Since different conditions of individual behaviours matter in the case of permanent users of busses or decided cyclists, and yet different ones are to be entailed while analysing those keen on car driving. On the other hand, transport behaviours of the young generation have only started being channelled, still they condition the options of sustainable development of transport in a longer perspective. Therefore, the sustainable transport development agenda should not only entail the diversification of transport behaviour determinants within the given target group (e.g. drivers), but also differences between specific groups. It also involves the necessity to eliminate the cognitive dissonance in individual groups, and particularly among children and the youth perceiving the world as 'overrun by cars', on one hand, and on the other hand, being persuaded of sustainable behaviours.

Literature

2007 World Population Data Sheet, Population Reference Bureau, Washington 2008, http://www.prb.org/pdf07/07WPDS_Eng.pdf [31.01.2013].

Antonides G., Raaij W.F. van, *Zachowanie konsumenta*, PWN, Warszawa 2003.

Biała Księga, *Plan utworzenia jednolitego europejskiego obszaru transportu – dążenie do osiągnięcia konkurencyjnego i zasobooszczędnego systemu transportu*, KOM (2011) 144, final version.

Coada A., Haanb P. de, Wörsdorfer J.S., *The Role of Knowledge, Incentives and Consumption Behavior in Environmental Innovations: An Application to Car Purchases*, DIME Workshop "Empirical Analyses of Environmental Innovations", Karlsruhe 2008, http://www.dime-eu.org/files/active/0/ISIWorkshopCoad.pdf [5.12.2012].

Communication from the Commission to the European Parliament, the Council, the European Social and Economic Committee and the Committee of the Regions, *Europa efektywnie korzystająca z zasobów – inicjatywa przewodnia strategii "Europa 2020"*, KOM(2011) 21, final version.

"Czas oczyścić powietrze", *Przyroda dla Europejczyków*, Magazine of the General Directorate for Environment, http://ec.europa.eu/environment/news/efe/20/article_2434_pl.htm [27.12.2008].

Defining an Environmentally Sustainable Transport System, Commission Expert Group on Transport and Environment 2000, http://www.ocs.polito.it/biblioteca/mobilita/Defining.pdf [31.01.2013].

EST! Environmentally Sustainable Transport. Future, Strategies and Best Practices, Synthesis Report of the OECD project on Environmentally Sustainable Transport (EST) presented on occasion of the International *est!* Conference, Vienna, 4th to 6th October 2000.

EU Transport in Figures. Statistical Pocketbook 2012, European Union, 2012, http://ec.europa.eu/transport/facts-fundings/statistics/doc/2012/pocketbook2012.pdf [1.12.2012].

Eurostat, http://appsso.eurostat.ec.europa.eu/nui/setupDownloads.do [1.01.2012].

Fiedor B., Czaja S., Graczyk A., Jakubczyk Z., *Podstawy ekonomii środowiska i zasobów naturalnych*, C.H. Beck, Warszawa 2002.

Handbook on Estimation of External Costs in the Transport Sector, European Commission DG TREN, Delft 2008.

http://www.mobilityweek.eu/ [1.02.2013].

Impact Assessment. Accompanying Document to the White Paper Roadmap to a Single European Transport Area – Towards a Competitive and Resource Efficient Transport System, European Commission 2011, COM(2011) 144, final version.

Information provided by Prof. Udo Becker (Dresden University of Technology, Germany) at a training session on mobility management organised under the "Transport Learning" cycle; Krakow, 24th January 2013.

Jachnis A., *Psychologia konsumenta. Psychologiczne i socjologiczne uwarunkowania zachowań konsumenckich*, Oficyna Wydawnicza Branta, Bydgoszcz 2007.

Karczewska M., "Determinanty zachowań konsumenckich na rynku", in: *Materials of the 2010 Krakow Conference of Young Scientists. Symposia and Conferences of the Krakow Conference of Young Scientists*, No. 5, Pro Futuro Scientific Group, AGH University of Science and Technology in Krakow, Kraków 2010, http://www.profuturo.agh.edu.pl/pliki/Referaty-_V_KKMU/NE/r475-484_Karczewska.pdf [31.01.2013].

Key World Energy Statistics 2012, International Energy Agency, http://www.iea.org/publications/freepublications/publication/kwes.pdf [31.01.2013].

Marszałek S., *Ekonomika, organizacja i zarządzanie w transporcie*, Wyd. Śląskiej Wyższej Szkoły Zarządzania, Katowice 2001, Katowice 2001.

Monitorowanie postaw społecznych w zakresie zrównoważonego transportu. Pierwszy etap badania, a rreport developed under a commission of the Ministry of Environment, PBS DGA Sp. z o.o., Sopot 2010, http://www.mos.gov.pl/g2/big/2010_12/7b2301bd6c0c4c7a-4013ca88560e1558.pdf [31.01.2013].

Oil Bulletin. History from 2005 Onwards, European Communities 2011, http://ec.europa.eu/energy/observatory/oil/bulletin_en.htm [5.12.2012].

"Our Common Future", Report of the World Commission on Environment and Development, WCED, United Nations, 11 December 1987, http://www.un.org/documents/ga/res/42/ares42-187.htm [31.01.2013].

Paradowska M., "Akceptacja publiczna jako element kształtowania zrównoważonych systemów transportu w miastach", *Handel wewnętrzny* 2012, Vol. 3.

Paradowska M., *Rozwój zrównoważonych systemów transportowych polskich miast i aglomeracji w procesie integracji z Unią Europejską – przykład aglomeracji wrocławskiej*, Wyd. Uniwersytetu Opolskiego, Opole 2011.

Platje J., *Institutional Capital – Creating Capacity and Capabilities for Sustainable Development*, Wyd. Uniwersytetu Opolskiego, Opole 2011.

Platje J., Paradowska M., *Zarządzanie kryzysowe w przedsiębiorstwie transportowym*, Wyd. Nasz Dom i Ogród "Flora", Wrocław 2011.

Polityka transportowa państwa na lata 2001-2015 dla zrównoważonego rozwoju kraju, Ministerstwo Infrastructury, Warszawa 2001.

Project on Environmentally Sustainable Transport (EST). Report on the OECD Conference Environmentally Sustainable Transport (EST): Futures, Strategies and Best Practice, OECD, Vienna 2000, http://esteast.unep.ch/phocadownload/oecd0003.pdf [31.01.2013].

Puławska S., "Koszty zewnętrzne w polityce transportowej Unii Europejskiej", *Transport i ochrona środowiska* 2008, No. 5-6.

Rolka M., *Paliwa – detaliczne ceny na stacjach paliw od 20.03.2004 do 29.11.2012*, http://mrc.tychy.pl/ceny.paliw/ [5.12.2012].

Soft Measures and Transport Behaviour, EST, OECD, Berlin 2002, http://www.oecd.org/env/transportandenvironment/16199621.pdf [31.01.2013].

Stern P.C., "Information, incentives, and proenvironmental consumer behavior", *Journal of Consumer Policy* 1999, No. 22.

Stern P.C., "Toward a coherent theory of environmentally significant behavior", *Journal of Social Issues* 2000, No. 56(3).

Stern P.C., "Understanding individuals' environmentally significant behavior", *Environmental Law Review* 2005, No. 11(35).

The Contribution of Transport to Air Quality. TERM 2012: Transport Indicators Tracking Progress Towards Environmental Targets in Europe, EEA Report No. 10/2012, European Environment Agency, http://www.eea.europa.eu/publications/transport-and-air-quality-term-2012 [2.12.2012].

Transport — znów ostatnie miejsce w klasyfikacji Kioto, European Environment Agency, 2011, http://www.eea.europa.eu/pl/pressroom/newsreleases/transport-2014-znow-ostatnie-miejsce-w-klasyfikacji-kioto [1.12.2012].

Transport, eds. W. Rydzkowski, K. Wojewódzka-Król, PWN, Warszawa 2007.

Zrównoważona konsumpcja i produkcja. Środowisko Europy. Czwarty Raport Oceny, Report No. 1/2007, European Environment Agency 2007, http://www.eea.europa.eu/pl/publications/srodowisko-europy-2014-czwarty-raport-oceny [3.12.2012].

Problematyka budowy instrumentów na rzecz kreowania zrównoważonych zachowań transportowych

Streszczenie. W niniejszym artykule zarysowano problematykę dotyczącą zachowań transportowych oraz złożoności determinant, które warunkują wybór określonego sposobu przemieszczania się. Rozważania te posłużyły próbie oceny skuteczności i zasadności niektórych instrumentów na rzecz zrównoważonego rozwoju transportu jako sektora, który z jednej strony jest niezbędnym czynnikiem rozwoju społeczno-gospodarczego, a z drugiej generuje liczne negatywne efekty zewnętrzne obniżające poziom dobrobytu społecznego. Celem artykułu było ukazanie pewnych kierunków rozwoju działań na rzecz budowy zrównoważonych zachowań transportowych.

Słowa kluczowe: zrównoważony rozwój transportu, zachowania transportowe, narzędzia zrównoważonego rozwoju transportu, badania świadomości ekologicznej polskich kierowców