Transport Policy Instruments for Sustainable Development of Transport

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Transport brings significant social, economic, spatial and environmental effects, and thus is an important factor in the sustainability of society and the economy.
The subject of the work is the sustainable development of transport, meaning socially and economically justified activities related to the creation of conditions and the implementation of environmentally friendly and human-friendly practices of facilities, equipment and other solutions that perform the functions of movement.
The purpose of the study was to present the theoretical basis for the sustainable development concept, derived from the idea of sustainable development - sustainable transport, and to present goals that are to be achieved by improving sustainable transport, with the potential to contribute to a specific target by means of instruments divided into categories: economic instruments, technological instruments, legislative instruments, organizational instruments, market instruments, educational instruments.

Keywords: sustainable development, sustainable transport, sustainable development of transport, sustainable transport instruments.

1. INTRODUCTION

Transport is an area with a wide range of relationships and links with the economy, society, and environment. A factor contributing to the direction of development of the transport system is the conception of sustainable development, which aims at satisfying the economic, social and ecological needs of society. The obligation to take into account the principles of sustainable development in socio-economic and sectoral policies, actions and policies of the European Union gives this factor a particularly important role in setting the direction of social-economic development, including the transport sector.

An environmentally sustainable transport system is one where [OECD/BMLFUW, s. 105]: *transportation does not endanger public health or ecosystems and meets needs for access consistent with (a) use of renewable resources below their rates of regeneration, and (b) use of non-renewable resources below the rates of development of renewable substitute*.

Achieving sustainability in transportation is possible by means of effective and available instruments.

The purpose of the study was to present the theoretical basis for the sustainable development concept, derived from the idea of sustainable development - sustainable transport, and to present goals that are to be achieved by improving sustainable transport, with the potential to contribute to a specific target by means of instruments divided into categories: economic instruments, technological instruments, legislative instruments, organizational instruments, market instruments, educational instruments.

This subject was raised because of its attractiveness and current interest in it.

2. THE THEORETIC ASPECTS OF SUSTAINABLE DEVELOPMENT

Sustainability can be called the fundamental human desire to protect, improve quality of life. The concept of sustainability includes integrated human activities (the need for coordinated decisions between different interest groups, sectors and legislative systems) [Pawłowska, p.65]. Development is inextricably linked to the continuity of the transformation process[1]. This process cannot exist without a stable institutional, ethical, legal, technological, organizational basis and social awareness which guide the direction of development.

There are many definitions of sustainable development, the most common concept of sustainable development was included in the Report: Our Common Future, 1987[2] which defines sustainable development as: *development that meets the needs of the present without compromising the ability of future generations to meet their own needs* [Report WCED, p. 16].

According to the Brundtland Report, civilization has reached a level of prosperity which is possible to be maintained if it is properly managed. The model of such an economy is intended in a conscious and appropriate way to shape relations between economic growth, environmental care and quality of life. The doctrine of sustainable development strives for social justice through, inter alia, economic and environmental effectiveness of undertakings [Dziuba, p. 51].

Since the publication of the definition of sustainable development by the Brundtland Commission, many researchers and practitioners have formulated and presented their own alternative definitions of concepts, but to date there has been no definite definition of sustainable development.

Literature of the subject presents two main approaches to sustainable development [Skowroński, p. 51]:

- economic growth in which economic growth is identified with a paradigm of environmental protection,
- ideologically and historiographically, focusing on new behaviours and social goals contributing to the development of the whole civilization [Piontek, p. 51].

Table 1 presents selected definitions of sustainable development of Polish and foreign authors, which are based on an economic and ideological-historical approach to the term of sustainable development.

Table 1. Selected definitions of sustainable development.

Source	Definition of sustainable development
Pirages D.C. 1977, A social design for sustainable growth, [w:] The Sustainable Society – Implications for Limited Growth, New York	Economic growth, which is supported by the natural and social environment.
Górka K., Poskrobko B., Radecki W. 1995, Ochrona środowiska. Problemy społeczne, ekonomiczne i prawne, PWE, Warszawa	This course of economic development, which does not materially and irreversibly affect the environment of human life, reconciling the laws of nature and the law of economics.
Kozłowski S. 1998, Ekologiczne problemy przyszłości świata i Polski, Komitet Prognoz „Polska w XXI wieku" przy Prezydium PAN, Warszawa	This way (model) of socio-economic development of a particular area, the assumptions of which result from natural conditions, do not compromise ecological balance and guarantee survival not only present but also future generations.
Dunphy D., Benveniste J., Griffiths A., Sutton P. 2000, Sustainability: The Corporate Challenge of the 21st Century, Allen &Unwin, New SouthWales, Australia	It covers the types of economic and social development that protect the environment and strengthen social justice.
Dasgupta P. 2007, MeasuringSustainable Development: Theory and Application. Asian Development Review 24	The economic program, according to which the average prosperity of present and future generations taken together is not reduced in time.
Maternowska M. 2013, Sustainable Development - Implications for Logistics Management, Logistics and Transport, Vol 19, No 3	Sustainable development is a process of change that implements a feature balance evaluated positively from the perspective of at least anthropocentric value system.

Source: ownelaboration on the basis of Stanny M, Czarnecki A., Zrównoważony rozwój obszarów wiejskich Zielonych Płuc Polski. Próba analizy empirycznej, Instytut Rozwoju Wsi i Rolnictwa Polskiej Akademii Nauk, Warszawa 2011 and Maternowska M., Sustainable Development - Implications for Logistics Management, Logistics and Transport, Vol 19, No 3/2013.

[1] Constant motion and related interactions of phenomena taking place in the surrounding reality.

[2] Also known as the Brundtland Commission Report, Brundtland Report.

The essence of sustainable development is the coexistence of economic, social and environmental relationships through the achievement of the following objectives [Machowski, p. 100–101]:

- economic, consisting in satisfying material human needs,
- social, social minimum, food supply, health, culture and education,
- ecological, deterioration of the natural environment and the elimination of threats connected with the operation of nature forces.

Sustainability is a concept that is largely based on creating a chance of finding a compromise between the three components: economic, social and ecological reasons. Ambiguity of the term - sustainable development creates and delivers new values, allows for adaptation to very different situations and contexts, space and time [Rokicka, Woźniak, p. 121-122].

Sustainable economic and social-ecological development is one of the most important challenges of the modern world. It has become a leading mission of, among others, numerous state institutions, sustainable cities, local communities and corporate enterprises.

3. CONCEPTION OF SUSTAINABLE DEVELOPMENT IN TRANSPORT

Technological progress, economic-social and political change have influenced development priorities, value systems and put forward new challenges ahead of transport, of which the most important are [Wojewódzka-Król, Rolbiecki, p. 88]:

- changes in the distance structure and assortment of demand for transport,
- globalization and the associated increase in demand for transport,
- the dominance of road transport and its effects,
- the idea of sustainable transport and the development of research into the impact of transport on the environment as well as the search for environmentally friendly development options.

Transport brings significant social, economic, spatial and environmental impacts and is therefore an important factor in relation to the phenomenon of social and economic sustainability. On the one hand, it contributes significantly to the degradation of the natural environment, and on the other hand, it is the basis for economic development of the regions.

The idea of sustainable transport derives from the concept of sustainable development. An environmentally sustainable transport system is one where [OECD/BMLFUW, p. 105]: *transportation does not endanger public health or ecosystems and meets needs for access consistent with (a) use of renewable resources below their rates of regeneration, and (b) use of non-renewable resources below the rates of development of renewable substitute.*

The literature on the subject distinguishes two approaches for sustainable transport - broad and narrow. The narrow approach to sustainable transport is based on environmental aspects, reflected in the definition of this interpretation as environmentally sustainable transport. In broad terms, sustainable transport is treated in the convention of integrated governance. This means that the transport of people and cargo is carried out in a way which takes into account economic, social and environmental criteria [Pawłowska, p. 65]. Figure 1 shows the characteristics of transport sustainability.

A sustainable transport system is one that [OECD/BMLFUW, p. 105]:

- *provides for safe, economically viable, and socially acceptable access to people, places, goods, and services,*
- *meets generally accepted objectives for health and environmental quality (e.g., those concerning air pollutants and noise put forward by the World Health Organization),*
- *protects ecosystems by avoiding exceeding critical loads and levels for ecosystem integrity, e.g., those adopted by the UNECE for acidification, eutrophication, and ground-level ozone; and*
- *does not aggravate adverse global phenomena such as climate change, stratospheric ozone depletion, and the spread of persistent organic pollutants.*

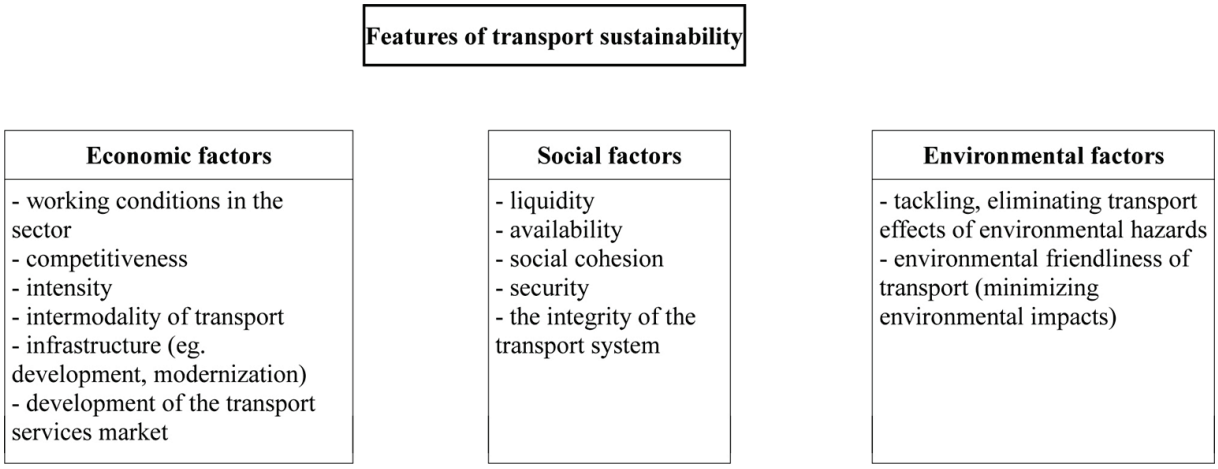

Fig. 1. Balancing features of transport.
Source: own elaboration on the basis of Pawłowska B., *Zrównoważony rozwój transport jako przykład poprawy efektywności sektora*, Acta Universitatis Lodziensis, No 313, Łódź 2015.

4. TRANSPORT POLICY INSTRUMENTS FOR SUSTAINABLE TRANSPORT DEVELOPMENT

European Commission in the White Paper - *Roadmap to a Single European Transport Area - Towards a competitive and resource efficient transport system* emphasize the need to take action to ensure a sustainable development of transport at a higher level.

The tasks of today's EU transport policy can be grouped into seven main objectives that will be achieved by improving transport sustainability [Pawłowska, p. 73]:

1) alleviation of congestion,
2) reduction of transport energy intensity,
3) improving safety in transport,
4) improving the acoustic climate,
5) reduction of pollutant emissions, greenhouse gases from transport,
6) levelling bottlenecks and infrastructure gaps in individual countries,
7) improving the quality of transport infrastructure, mobility of citizens.

The objectives are to be achieved through effective and accessible instruments. The basic toolkit can be included [Pawłowska (a), p. 322]:

- a coherent framework for financing - financing, raising funds to support the sustainable development of transport,
- development, modernization of transport infrastructure - actions which are to improve infrastructure in order to ensure territorial cohesion of economic growth,
- legislative actions - legal actions aimed at promoting the process of liberalization of the transport market and promoting competition,
- promoting innovation, implementing new technologies to accelerate the process of building an economy that is based on renewable energy sources, low carbon consumption, and maintaining global leading position in this field,
- building social and environmental awareness - creating appropriate patterns of social behaviour through education, greater social engagement, increased access to information,
- ensuring proper development of external relations, building consensus and European unity - promoting good practices and community solutions, developing transport links,
- coordination of activities and implementation of effective management at various levels, in particular in the areas of:
  a) ensuring interoperability by creating uniform standards,
  b) cooperation with local authorities on the basis of the principle of subsidiarity in order to improve the functioning of urban transport.

The main focus is on a coherent framework for funding, extension and modernization of transport infrastructure, legislative action, support for innovation and implementation of new technologies. Building social and environmental awareness, coordinating actions and implementing effective management at various levels, caring for the proper development of external relations,

building consensus and European unity in this area are supportive.

Table 2 sets out the above-mentioned objectives, the achievement of which is to ensure that there is an improvement in sustainable transport and can contribute to the achievement of a concrete objective by means of the following categories:

- economic instruments,
- technological instruments,
- legislative instruments,
- organizational instruments,
- market instruments,
- educational instruments.

Table 2. Sustainable transport development instruments.

Purpose of the action	**Instrument/Tool**		
Alleviation of congestion	Economic instrument	Optimization of demand for transport services	
	Economic instrument	Introduction of a fair infrastructure charging system	
	Technological instrument	Infrastructure development and modernization	
Reduction of transport energy consumption	Technological instrument	Applying new technological solutions - *clean technologies*	Vehicle
	Legislative instrument	Tightening of emission standards from vehicles	
	Organizational instrument	The creation of mechanisms to support the use of alternative fuels	Fuel
	Market instrument	Promoting and supporting bio-fuels	
	Technological instruments	Optimizing fuel consumption in the engine	
	Market instrument	Promotion of environmentally friendly branches (intermodal transport, coastal shipping)	Optimization of branch structure
	Technological instruments	Works on intelligent transport systems	Organization and optimization of traffic management
Improving safety	Technological instrument	Technical solutions that reduce the risk of hazards for cyclists and pedestrians	Vehicle
	Technological instrument	High level of vehicle safety and increased vehicle compatibility with respect to requirements	
	Educational instrument	Action to change the behaviour of transport users	Traffic management
	Technological instrument	Improvement of infrastructure quality, especially road	
	Technological instrument	New solutions for traffic management in infrastructure	
Improving acoustic climate	Technological instrument	Noise reduction: as a result of modern vehicle solutions, new building solutions, by using acoustic screens	
Reducing emissions of greenhouse gases from transport	Economic instrument Market instrument Educational instrument	Measures to reduce the demand for transport	Increasing efficiency and rational use of energy in transport
	Market instrument	Promoting the integration of logistics and transport policy	
	Technological instrument	Support for research and use of alternative fuels	
Bridging bottlenecks and deficiencies in infrastructure in each country	Technological instrument	Implementation of the projects envisaged in the TEN-T program	Completion of quantitative and qualitative deficiencies in transport infrastructure
	Organizational instrument	Introduction of an optimal road infrastructure management system with appropriate division of competencies	
Improving the quality of transport infrastructure, mobility of citizens	Educational instrument	Acceptance of pro-ecological activities on the part of the society	
	Educational instrument	Informing the public of negative environmental effects and the impact of transport on the environment	

Source: own elaboration on the basis of Pawłowska B., Zrównoważony rozwój transportu na tle współczesnych procesów społeczno-gospodarczych, Wydawnictwo Uniwersytetu Gdańskiego, Gdańsk 2013.

5. CONCLUSION

The concept of sustainable development emerged in Europe in the sixties of the last century.

Since then, due to the destabilization of economic, social and natural systems, excessive use of natural resources, progressive industrialization, pollution of the environment and dynamic development of urban, economic processes, actions are being taken to shape pro-ecological social and environmental awareness [Rucińska, p.285].

Sustainable development is characterised by:

- shaping pro-ecological social attitudes,
- prevention of depletion of biodiversity,
- environmental protection (reduction of greenhouse gas emissions)
- a low-carbon, competitive economy where natural resources are used in a rational way,
- developing and implementing environmentally friendly, innovative techniques, technologies,
- the use of intelligent, effective power grid.

Sustainable development is achieved through international, national and regional regulations in various sectors. The idea of sustainable transport is a part of the concept of sustainable development. Implementing the principles of sustainable development of transport is a long-term process of improvement of applied solutions and undertaken actions. Achieving sustainability in transportation is possible by means of effective and available economic, technological, legislative, organizational, market instruments and educational instruments, based on: a coherent framework of financing, expansion and modernization of transport infrastructure, legislative actions, fostering innovation, implementing new technologies, building social and environmental awareness, concern for the proper development of external relationships, building consensus and European unity.

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Date submitted: 2017-11-08
Date accepted for publishing: 2018-02-12

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