

Sustainable transport systems: trends and policies

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Abstract

Sustainable transport systems meet all the main principles of sustainable development: protection of public health and environmental quality, respect of the ecosystems, limitation of emissions, sustainable use of renewable resources and minimum use of non-renewable resources. In the framework of this paper, the international trends and policies concerning sustainable transport systems are presented and discussed. The international organisations, which set these policies, are also presented. More specifically, the O.E.C.D. (Organisation for Economic Cooperation and Development) guidelines towards environmentally sustainable transport are considered to be very important. In addition, the European Community moves towards the implementation of a common transport policy facing two basic issues: breaking the link between economic growth and transport growth and achieving equal growth of all transport modes. Moreover, the E.C.M.T. (European Conference of Ministers of Transport) tries to create an integrated transport system through member countries and the rest of the continent by analysing environmental, social and traffic policy issues. Furthermore, the role of World Bank is considered to be very important in obtaining transport social sustainability, as it contributes to the creation of essential transport infrastructure in developing countries. Finally, the World Business Council for Sustainable Development (W.B.C.S.D.) started in 2002 the Sustainable Mobility Project, in order to set the goals of a sustainable transport system.

Keywords: sustainability, transport systems, transport policies, environmental protection.



1 Introduction

Transport is considered to be the leading advocate of world's economical development. Although it plays an important role in economic growth, there is a need for it to be transformed into an improved version, which will combine environmental protection and social equity, as well. This can represent a brief definition of sustainable transport.

Sustainable transport systems, with regard to the general definitions of sustainability, are transport systems that emphasize the fact that the future generations should be able to meet their own needs as well. In order for this to be accomplished, sustainable transport systems must combine specific policies to the direction of emission control, road safety, confrontation of congestion and access provision [1].

Sustainable transport systems are the systems that include the basic principles of sustainable development. More specifically, a sustainable transport system:

- complies with the targets that were set globally for public health and environmental protection such as the limits of W.H.O. for pollution and noise.
- protects the ecosystems and respects their limits such as eutrophication and ozone limits.
- does not enhance global negative phenomena such as destruction of the ozone layer and climate changes.

Summarizing, a sustainable transport system is open to all people, freight, places and services in an environmentally responsible, socially acceptable and economically sustainable way. It is a transport system that fulfils transport needs without risking public health and ecosystems [2].

2 The role of O.E.C.D. (Organisation for Economic Cooperation and Development)

In 1998 the O.E.C.D. created guidelines for the achievement of global, national, regional and local sustainable transport policies. These guidelines were based on the main principles of sustainable transport, which were defined at the O.E.C.D. Conference for Sustainable Transport (Vancouver, 1996).

In an effort to give diagrammatically the definition of sustainable transport systems, the basic principle is that whereas transport leads to economic growth, economic growth creates basic problems to the achievement of sustainable transport (Figure 1).

The basic guidelines that the O.E.C.D. proposes are:

- Development of a long-term transport plan in order to achieve sustainability and access. At the same time, evaluation of the long-term transport trends, taking into consideration the environmental, social and economical effects of the present situation.
- Creation of specific environmental and health targets based on environmental and sustainable criteria and set of milestones.
- Combination of policies leading to technological advancement and drastic changes in the transport field.



- Assessment of the social and economical effects of the transport plans so that it could be socially and economically viable.
- Specification of the exact transport plan needed to be applied, which will combine different policies such as road use charging, traffic and traffic demand management, infrastructure and public transport improvement.
- Adjustment of the transport plan to the local, regional and national conditions, specification of responsibilities and milestones, ensuring of public involvement and application monitoring in order to take all the necessary corrective measures.

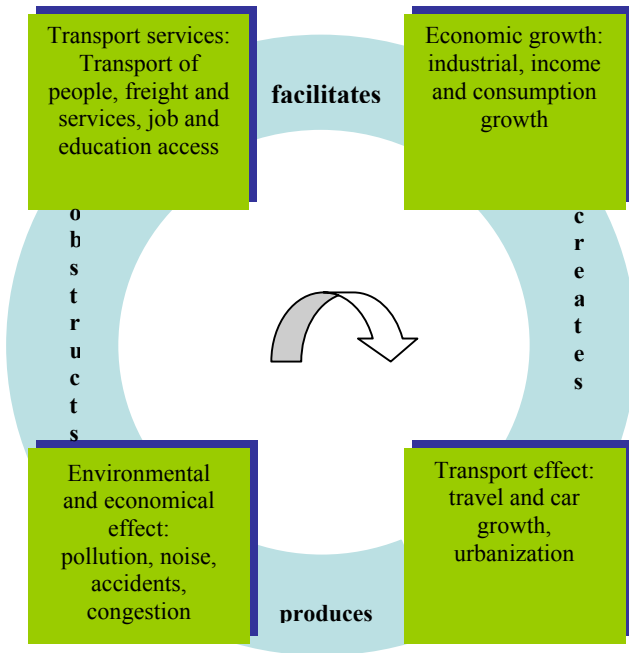


Figure 1: Interdependence of transport and economic growth [3].

In order for the member countries to use these guidelines and achieve sustainable transport systems, there is a need to evaluate their present transport systems by using criteria such as levels of CO₂, VOC, NO_x and PM emissions, noise levels and land use occupied by transport infrastructure.

The benefits of the application of sustainable transport systems can be encountered in all aspects of human life. More specifically, sustainable transport systems improve life quality by improving national, regional and local environmental quality and public health. Moreover, sustainable transport systems have a positive effect on social conditions by introducing alternative transport systems and improving considerably the accessibility.

The economic effects of sustainable transport systems are also very important as they include the reduction of accidents, the construction of sustainable infrastructure, the use of advanced technology and the increased use of public transport. One of the most important advantages of sustainable transport systems is that they can be achieved through the implementation of different policies with regard to the specific local, regional and national conditions [2].

3 A common European transport policy

Transport systems have become the most essential part of human life since people need to move on everyday basis in order to have access to work and education. The development of modern transport systems must support economic growth, but their unpleasant effects such as noise, congestion, health and environmental problems are inevitable [4].

Due to the continuous increase of mobility in the European Union, effects such as congestion and bottlenecks can be encountered in all countries throughout Europe. Unless serious action is taken, the cost of congestion will increase by 142% and will reach 80 billion euros per year. The basic reason for this extremely high cost, is that the cost of using transport infrastructure and modes does not reflect the actual cost of transport which also includes the externalities, i.e. the cost of congestion, noise, accidents, pollution and other environmental impacts (land use etc) [5].

Consequently, it is essential all European countries to adopt a Common European Transport Policy in order to face efficiently negative phenomena such as congestion and noise and ensure access to all civilians.

There have been taken important steps to the direction of a Common European Transport Policy. The Treaty of Rome in 1957 was the first step towards the generation of a Common European Transport Policy. Thirty years after, the Court of Justice decided the implementation of the Treaty of Rome in order to achieve the adaptation of the Common European Transport Policy. In 1992 the first White Paper of the Committee was published. Its basic concept was the opening of the transport market. In 2001 the new White Paper "European Transport Policy for 2010: time to decide" was published [5, 6].

The basic target of the White Paper is transport growth's gradual release from economical development. The most effective way to achieve this gradual release is the combination of road transport charging policies with policies that improve other transport modes and that require investments in transport infrastructure. Investments in the transport field will lead to a balanced development of all transport modes and to the gradual abolition of the dominance of road transport.

In order to achieve a balanced development of all transport modes and transport growth's gradual release from economical development, the White Paper 2001 proposes the revival of rail transport by increasing its security, opening the European railway transport market and supporting the operation of new infrastructure. It also proposes the construction of a Trans-European network that will eliminate bottlenecks, absorb a large amount of today's traffic and serve remote areas. With regard to waterway transport, it proposes the

development of new infrastructure, the increase of passenger and freight security, the simplification of the waterway transport legal frame and the improvement of inland waterway transport.

As far as air transport is concerned, the White Paper 2001 proposes measures such as the improvement of management of available airports, the promotion of the idea of a Single European sky and the cooperation with the United States of America in order to create a Joint Transatlantic Aviation Agreement. With regard to road transport, the proposed measures refer to quality improvement such as harmonization of the conditions of the road transport contacts and promotion of the profession of road transporter. Another important issue is road safety which can be achieved through specific actions such as the detection of the dangerous sites throughout the European road network, the reduction of driving under the effect of alcohol and drugs, the implementation of new technologies and the enforcement of effective inspections. Relatively, better demand management of public transport and better use of the infrastructure can improve urban transport.

One of the most important issues of White Paper 2001 is sustainability. In order to achieve sustainable transport systems, the funding of research programs in alternative transport modes, transport multimodality, renewable energy sources, new technologies for improved energy consumption and safety are necessary. The conclusions of research programs must be applied in all member countries.

In order for transport systems to be anthropocentric, the adoption of a Common European Transport Policy demands the solution of specific issues such as the improvement of public transport, the reduction of private car use, the funding of a Trans-European Transport Network for the connection of remote areas, the confrontation of congestion and bottlenecks, the development of rail transport across Europe and the improvement of public information policy [5].

4 The contribution of the E.C.M.T. (European Conference of Ministers of Transport)

European Conference of Ministers of Transport is an intergovernmental organization, which was founded in Brussels in 1953. Members of the council of the E.C.M.T. are the Ministers of Transport of 39 member countries of the O.E.C.D. and the secretariat of the E.C.M.T. is an administrative part of the O.E.C.D. [7]. The role of the European Conference of Ministers of Transport in the field of sustainable transport is considered to be very important as it contributes to the creation of a European transport system based on the principles of sustainable development such as environmental protection, social equality, safety and economical and technical effectiveness. Moreover, it contributes to the improvement of transport policies of the member countries by analyzing specific important transport issues. Specifically, these issues are the following:

- Environmental issues. The environmental impacts of transport are very important. Although there are low emission vehicles, high concentrations of NO_x, PM and O₃ are still a major problem. With regard to CO₂ concentrations, it is essential for the member countries to adjust to the CO₂ levels of the Kyoto



Protocol. Other environmental impacts of transport are destruction of the ecosystems due to transport infrastructure and noise in rural and urban areas.

- Social issues. With regard to the social environment, transport impacts are detected in the field of access and consequently wealth. Transport systems allow people to have market, goods, services and home access. As a result, they are the mean to achieve social and economical development. The most important issue in the transport field, with regard to the social environment, is the equity in access for all citizens.

- Traffic issues. One of the most important impacts of transport is congestion, which in nowadays is encountered in all developed countries. Other problems that need to be solved are accidents – especially due to road transport - and intimidation of the vulnerable road users.

The E.C.M.T. proposes a number of measures to the direction of sustainable transport systems. These measures can be applied in all member countries, dependently on each country's special conditions. As far as congestion is concerned, E.C.M.T. proposes the implementation of charging policies in specific areas and the improvement of land use planning design. Taxing and charging policies should be followed by the implementation of appropriate legislation. With regard to urban traffic, the improvement of the level of service of urban public transport is essential, which it can always be accompanied by traffic management measures such as parking management. As far as environmental quality is concerned, there are a lot of measures that could be adopted by member countries. More specifically, appropriate driving behaviour, car maintenance, traffic management, fuel efficiency, particle traps and research in the field of alternative technologies are essential. With regard to noise, several measures, which lead to noise reduction at the source as well as to the environment, are considered to be very effective (i.e. noise barriers). In conclusion, Ministers of Transport should consult the local authorities and the Ministers of Environment, Regional Development and Public Works, in order to achieve the optimum transport system design. Furthermore, they should cooperate with Ministers of Finance in matters of transport charging policies, taxation and investments. Additionally, the implementation of these measures requires public, political and media support throughout the preparation of proposals for traffic demand management, infrastructure construction and charging policies [7].

5 Sustainable transport systems and the World Bank

The World Bank has an unbroken band with the field of transport since one of its main priorities is to ensure that developing countries have the essential transport infrastructure leading to job, health, education and goods access for all citizens independently of their economic and social condition. Private investments cannot finance all transport infrastructures in developing countries. Regarding transport, World Bank's main role is to support the governments of developing countries to reform their transport practices and policies. Consequently, the World Bank requires support of all the interested parts.



According to the World Bank, a transport policy in order to be effective should upgrade life quality, support modern and improved ways of life and be accessible by all people. Consequently, a transport policy should combine economical, environmental and social sustainability (Figure 2).



Figure 2: Transport and sustainability [8].

An economical sustainable transport policy is defined by the following criteria:

- Investments in the transport field undergo cost – benefit analysis.
- Transport service quality is improved due to the competition created by interference of private companies in the transport field.
- Transport services’ cost is able to cover the maintenance cost of transport infrastructure.
- Public transport infrastructure and services are well developed and organized.
- Road transport domination is replaced with equal growth of all transport modes.

Additionally, an environmental sustainable transport policy is based on the following criteria:

- Its main priority is to control the transport impact on human safety and health.
- Demand for private car use is controlled leading to confrontation of congestion phenomena and reduction of energy consumption and air pollution.
- It is incorporated in environmental protection policies in the fields of demand management of transport, land use planning design, air pollution and public transport use charges.
- It protects vulnerable transport users, promotes public transport use and applies the appropriate instant charges to road users.

Finally, a social sustainable transport policy is defined by the following criteria:

-The cost of transport in rural and urban areas remains within acceptable levels in order to allow all citizens – even the most underprivileged ones – to have market, job, health, education and social activities access.

-One of its main priorities is to provide long distance transport of agricultural products and access to imported goods, which is essential for residents of rural areas and consequently for the economy of these specific areas.

-Cyclists' and pedestrians' transport is protected, as in the developing countries due to the low GDP the majority of people are not able to spend even the smallest amount of money on their transport [8].

Conclusively, the World Bank can play a leading role in the transformation of transport policies in the developing countries. Since, these countries have to confront basic problems regarding poverty, health and social inequality, an economical, environmental and social sustainable transport policy will at least solve the transport problems of all citizens independently of their economical and social status.

6 The role of the World Business Council on Sustainable Development (WBCSD)

The World Business Council on Sustainable Development is an association of 170 international companies. It was founded in 1991 in order to insure the companies' participation in Rio Earth Summit. The member companies come from 35 different countries and from more than 30 industrial sectors. Its network consists of more than 50 national and international business councils situated in developing countries and in 15 O.E.C.D. member countries. Sustainable development is a combination of economical advancement, ecological balance and social development. The World Business Council on Sustainable Development takes action towards the direction of sustainable development, representing thousands of companies interested in this field. One of the most prototype initiatives of the W.B.C.S.D. is the Sustainable Mobility Project, which was first presented in 2002. The Sustainable Mobility Project's innovation was an international initiative of the industrial sector to the direction of sustainable transport systems. A major advantage of the Sustainable Mobility Project is that it ensured public involvement by conducting workshops all around the world and by presenting their results to the public. The results of Sustainable Mobility Project's workshops were released in the paper: "Mobility 2030: Meeting the challenges to Sustainability". This paper includes the research efforts of more than 200 scientists from 12 industrial companies towards sustainable transport systems. More specifically, this paper defines the relationship between economical, environmental and social sustainability and transport, and recommends a number of international measures and policies to the direction of sustainable transport [3]. With regard to the Sustainable Mobility project, sustainable transport can and will be achieved through the implementation of the following measures:



1. Reduction of transport emissions so that they will no longer be catastrophic to human health. It is important to make a separation between developed and developing countries. Consequently, in developed countries this can be achieved until 2030. In developing countries it depends on the technology they have and on the effects of this reduction on their transport capability.
2. Reduction of greenhouse gas emissions so that they will reach sustainable levels. This reduction can be achieved through the application of specific measures in the fields of vehicle fuel consumption, use of alternative and more friendly to the environment transport modes and reduction of emissions in the mining and production fuel processes.
3. Reduction of transport related accidents and noise. Concerning transport related accidents action must be taken locally, regionally and nationally. With regard to noise, all proposed measures could be applied only locally.
4. Confrontation of congestion. Congestion is a phenomenon related to transport that could be faced with specific measures such as charging and transport demand and infrastructure management.
5. Elimination of inequalities with regard to the transport opportunities of all people. These inequalities can be encountered between different countries and among one country's citizens. People living in urban and rich areas have more transport opportunities than those living in rural and poor areas. The solution is not to decrease the urban transport opportunities but to keep them steady as well as increasing rural transport opportunities [3].

In conclusion, sustainable transport systems serve people's need for safe transport as well as respecting the environment and the social equality. With regard to environmental respect, they decrease gas emissions, use of non-renewable resources, noise, land use and they support recycling. Regarding social equity, sustainable transport systems offer transport opportunities, they are accessible to all people living in different parts of the world and they support economic growth.

7 Conclusions

In order to achieve sustainable transport systems there is a number of measures that need to be taken and a number of policies that need to be adopted by the interested countries. These policies can be adopted locally, regionally, nationally and even internationally. The most important policies mentioned in this paper, can be summarized in the following: traffic demand management, reduction of transport related accidents, pollution and noise, improvement of land use planning and design, infrastructure and public transport quality and funding of research programs. Additionally, a public information policy is considered to be the first basic step to the direction of sustainable transport systems. Sustainable transport systems are the ideal transport systems since they combine social, economical and environmental sustainability. Social sustainability of transport systems is related to serving the basic human needs for health, safety and comfort, supporting contemporary lifestyles and sharing the same transport opportunities and facilities, whereas their economical sustainability is associated



with the amount of money spent by people in order to use them, the efficiency of their services and the way they support economical development. Finally, their environmental sustainability lies in ecosystems' and non-renewable resources' protection, use of renewable resources, recycling initiatives and reduction of transport related gas emissions [9, 10]. There have been very important initiatives towards the direction of sustainable transport systems. The conclusion that arises from all the policies and measures mentioned above is that sustainable transport can become a reality only through international cooperation and public involvement.

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