

ARAŞTIRMA MAKALESİ / RESEARCH ARTICLE

HIGH SPEED RAILWAYS AND INNOVATIVE APPLICATIONS IN THE CONTEXT OF SUSTAINABILITY

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Abstract

Transportation; Has made an important contribution to the development of society throughout history and has been the driving force of technological developments. In parallel with the increase of transportation possibilities, the communication and interactions of the societies with each other have been strengthened, which has made important contributions to the common civilization of mankind. Transportation; Is one of the leading service sectors today and has an influenced and influential relationship with social, technical, economic, cultural and political parameters. Technological developments in the 20th century reveal a wide range of needs and uses for each of the different transport modes. In the process we are in the 21st century; It is necessary to maximize the integration of these modes with each other through the effective and efficient use of each of the different transportation modes. Our country, which is in the process of economic development, shows planned growth targets in this frame. Economic growth; It is a process that can be passed on with a transportation system that has solved its problems and works. The most important point on problem-free and efficient transportation system; balanced distribution of modes and integration between modes. In our country, in modal distribution, the share of highways has a percentage over 90% on both the passenger and the freight. The geometric standards of the roads are below the highway standards and this case causes serious problems in road traffic safety.

Keywords: Transportation systems, high-speed railways, traffic safety, sustainability, intelligent transport systems

YÜKSEK HIZLI DEMİRYOLLARI VE SÜRDÜRÜLEBİLİRLİK BAĞLAMINDA YENİLİKÇİ UYGULAMALAR

Özet

Ulaştırma tarih boyunca toplumun gelişimine önemli katkı sunmuştur ve teknolojik gelişmelerin itici gücüdür. Ulaştırma imkanlarının artmasına paralel olarak ise toplumun birbiri ile etkileşimi ve iletişimi güçleşmiş olup insanlığın ortak uygarlığına önemli katkı vermiştir. Ulaştırma günümüzdeki öncü hizmet sektörlerinden bir tanesi olup sosyal, teknik, ekonomik, kültürel ve politi unsurlar ile etkileyen ve etkilenen bir ilişkiye sahip olmaktadır. 20.yüzyıldaki teknolojik gelişmeler geniş bir ihtiyaçlar dizisi ortaya çıkarmıştır ve her bir ulaştırma türü için farklı kullanım söz konusu olmuştur. Bu yüzyılda süreç içerisinde bu ulaştırma türlerinin etkin ve verimli kullanımı vasıtası ile türler arası entegrasyonun maksimize edilmiş bir gereklilik olmuştur. Ekonomik gelişim sürecindeki Türkiye belli bir kurgu dahilinde planlı gelişim hedeflerine sahiptir. Ekonomik gelişim problemlerini ve işlerini çözümlenmiş bir ulaşım sistemi ahilinde yürütülebilecek bir süreci ifade etmektedir. Problemsiz ve verimli bir ulaştırma sistemi için en önemli nokta ise dengeli türel dağılım ve türler arası entegrasyon olmaktadır. Ülkemizde türel dağılımda karayolu payı hm yolcu ve hem de yük taşımacılığında %90'ın üzerindedir. Karayollarının standartları otoyol standardının altında olup bu da ciddi problemlere neden olmaktadır.

Anahtar Kelimeler: Ulaştırma sistemleri, yüksek hızlı demiryolları, trafik güvenliği, sürdürülebilirlik, akıllı ulaştırma sistemleri

1. INTRODUCTION

Sustainability; 'Providing today's needs by considering the needs of future generations'. In this context, Sustainability, a process, also expresses its continuity. From here we will look at 'Sustainable Development', in short, we must make a turn to modern history in the West. West; 'Steamy' initiated with the invention of 'Unlimited and standard production', unlimited consumption, bringing resources in an unscheduled way and challenging the boundaries' experiences.

In 1987, the United Nations' Commission on Environment and Development introduced 'Sustainability Concept' broadly and various important decisions were taken in this context. For; Sources in our world were not limitless, unrestricted consumption approaches led to the essence of nature, to the presence of mankind and to the abolishment of economic sharing. All these facts revealed that 'Life in the World' will eventually become unsustainable for everyone as 'environmental, economic and social'. Moving from this, the circles that have begun to perceive the situation have been involved in a concept of 'sustainable' life within the political decisions, social measures and technical possibilities both locally, regionally and globally (Altan and Kızıldaş, 2019).

The main European Union policies on transport, identified as one of the three main issues to be jointly established with the Rome Treaty of 1957, are the integration of transport markets and the abolition of monopolies, the avoidance of unfair practices; Increasing the efficiency of transport across Europe, contributing to the transportation of persons, goods, operators and customers, thereby contributing to economic and social refinement, by creating effective logistics and employment opportunities that will

facilitate border crossings; The use of all transportation systems in integration, railway, inland waterway, short sea carriage and combined carriage in cargo transportation, and public transport in passenger transportation; Ensuring an acceptable, safe transport environment for users, employees and the whole community, from a social and environmental point of view, improving transport safety and setting targets for this purpose; Can be summarized as reducing the differences in existing legal regulations in Europe and improving the construction and operation of the transport system (infrastructure, vehicles and equipment, services and processes). The issues that need to be taken into consideration for these basic policies to be taken into consideration are the harmonization of legislation, liberalization, the development of multimodal transport, the development of infrastructure, the expansion of public transport in passenger transport, the development of intelligent transport systems, cooperation in research and development, internalization of external costs, Facilitation of transit and reduction of crime and fraud in international carriage (Kızıldaş and Altan, 2017).

1.1 European Union Transportation Policies and Turkey

The White Paper entitled "European Transport Policy for Decision Making, Decision Making Time" published by the European Commission for the formulation of a transport policy that can address the problems and needs related to transportation services is the White Paper on the Strategy for a Future for the Sustainable Transport, Is the first stage. In the White Paper, an approach has been identified within the framework of regulation of growth in the transport sector and overall economic growth in order to reduce problems such as road and environmental pollution, traffic intensity, and the protection of competition power in the economy.

The basic principles of this study, which determines the framework of the European Union's transport policies in the future, are divided into four main themes: balanced distribution among transportation modes, elimination of bottlenecks in transportation, centralization of transport policies of users and global transportation management.

The republic of Turkey It is expected that the Ministry of Development will reach a rate of up to 80% of the share of the Transport Sector by 2023 in 2013 targets and 2023 projections, which are set forth in the framework of the 10. High-speed railway investments, investments in the agenda, 3.Köprü, 3.Hava, Kanalistanbul, Gebze-İzmir Highway, Marmaray, Metro Lines, Iğdır-Şırnak-Hakkari-Kastamonu- (Ordu-Giresun) Airport, Zafer (Afyon Kütahya Usak) And the targets (completion of the 2023'te 11,000 km high-speed railway line, etc.) are the transportation sector investments. Therefore, Turkey, which has to grow economically and continues its regular economic development within the scope of its growth targets, has to make the transportation system work and be productive (Kızıldaş and Altan, 2017).

Intelligent Transportation Systems (ITS) Development Process

Intelligent transportation systems have begun to be used in developed countries in traffic safety, one of the most important problems in transportation. Today, there are significant developments in Brazil, China, Thailand and Taiwan as well as the pioneering of intelligent transport systems in the United States (USA), Germany, Britain, Australia, France, South Korea, Sweden, Japan, It is observed that the spread has been recorded. In the United States, these applications started with the idea of providing road and vehicle communication between 1960 and 1970, and from the middle of the 1980s, Mobility 2000 studies were

initiated by public-private-sector academy cooperation. In 1994, the 'Intelligent Transportation Society of America' was established by the Ministry of Transport. With the adoption of the safe, accountable, flexible, efficient transport justice law by the Congress in 2005, a \$ 110 million annual budget for research activities in this area was provided annually until 2009, following the US Department of Transport's federal budget and \$ 500 million at the national level, And \$ 1 billion in investment. Intelligent transport systems under the coordination of the Ministry of Transport focus on intelligent vehicles, intelligent infrastructure and intelligent transportation in coordination of the two. Intelligent transport systems in the United States show regional disparities and yet no national integration is mentioned (Bureau of the Census, 2011). Canada has an innovative character in intelligent transport systems and the first computer-controlled traffic signaling system in the world was implemented in Toronto in 1959. The 'full electronic toll system' which was introduced in 1999 is the first application in the world. This is due to the fact that different applications and integration deficiencies arise in these areas, such as in the US, as the territories of transport infrastructure investments and installation in Canada are responsible.

Japan, a developed country with its own characteristics due to its demographic structure, population, population distribution and topography, faced earlier problems with traffic problems, and the first activities that would later become the infrastructure of intelligent transport systems started in the 1960s. Between 1973 and 1979, a comprehensive vehicle traffic control system was established to provide road-to-vehicle communication, followed by a road vehicle communication system in 1984 in parallel with research activities. In Japan, rapid progress has been made at the national level on intelligent transport systems, as opposed to the United States, in the context of public, private sector, academia and, if necessary, integrating them together. In Australia, the first intelligent transportation systems have been in use since the 1970s, and it has become imperative that intelligent transportation systems be applied in order to effectively use the network, which has a geographically-based transportation network. Developed in 1992 following the establishment of the non-profit ITS Australia (intelligent transport systems of Australia), the national report was designed to provide Australia with an economic benefit of \$ 14.5 billion (US \$ 14.4 billion) by 2012 for all of these studies. Within the 2012-2015 national intelligent transportation systems strategy, safety, mobility and environment have been identified as three fundamental axes (Bureau of Transportation Statistics Research and Innovative Technology Administration, 2011).

1.2 Innovative Practices and the White Book

Sustainable development; Is a development model that does not compromise the right of future generations to meet their own needs while meeting today's needs. In this context, the transportation sector, often described as the heartbeat of the economy, constitutes one of the most important building blocks of the sustainable development of a country or region. This emphasizes the necessity of balancing the environmental, economic and social impacts of transport by creating sustainable transport policies (Burnett, 2009).

According to a survey conducted by the World Resources Institute (WRI) in 2005, 24.1% of CO2 emissions worldwide are due to the transportation sector. Therefore, many cities in the world are developing various policies to increase the use and dissemination of public transport systems in order to reduce the negative effects of transportation on the environment. Under these circumstances, it is clear that

the goal of creating a resource-efficient economy is a very challenging target for the transport sector, which is based on petroleum, the main cause of the noisy and regional air pollution, which is 34% more greenhouse gases in 2008 than in 1990. In this context, the European Union will continue to work on the roadmap to a Single European Transport Area, which is a road map with 40 concrete priorities in order to establish a competitive transport system, which will increase mobility, reduce fuel consumption and employment, Towards a “competitive and resource efficient transport system” (Kızıldaş, 2018). The current White Paper is pursuing a major transformation in the transportation system, multimodal, mobility-oriented, which reduces dependency on petroleum, creates modern infrastructures and is backed by intelligent information and management systems. At the same time, it is planned that this White Paper will reduce Europe’s dependence on exported oil by 60% by 2050 (Kızıldaş, 2018).

Some of the 2050 objectives of the White Paper are:

- In cities, the absence of traditional fuel-powered cars,
- Aviation uses 40% of sustainable low carbon fuel; At least a reduction of 40% in emissions from transport,
- Moving mid-way passengers and cargoes from the highway to rail and sea routes,
- All modes of transport contribute to a 60% reduction in emissions from transport.

Among the main principles mentioned in the White Paper are:

- While the dependence of the transportation system on petroleum is broken, the efficiency and freedom of circulation are not compromised,
- The emergence of new modes of transport for which larger volumes and more passengers can be transported together with the most efficient modes of transport (combination)
- Individual transportation, preferably at the last leg of the trip and with environmentally friendly vehicles,
- In other words; Concentration of road haulage to shorter distances (more than 300 km of long-haul multimodal transport is made economically attractive for goods shippers), while freight and passenger transport in the EU is more often done by rail and maritime transport,
- Establishment of special cargo corridors to optimize energy use,
- Removal of obstacles in transportation,
- Finding new financing methods for transport infrastructure
- Ensure that the pollutant gland is applied on a wider scale.

In this context, it is envisaged that the EU will reach a modal distribution share of up to 50% of the railway in its 30-year target. When we look at the context of economic sustainability, the fact that the EU is dependent on an energy-poor geography is totally dependent on oil and natural gas, it is very unpredictable that the current policy can be met in long run to meet its energy demand, and besides, Railroads are a mode of transport that can be operated with alternative fuel types (Altan and Kızıldaş, 2018).

1.3 High Speed Railway Policies

In this context, railway investments; Both road traffic safety and sustainability approaches, as well as

improvements in service parameters. Railway transportation type; Environment friendly, space-saving, high-capacity and safe transportation. When examining the historical development of railways; It seems that the railways that entered the breakthrough period with the republic were deprived of the necessary support to provide the expected service within the transportation system with another expression, which was neglected from the 1950s until the daytime, that is, more than 50 years ago. Between 1950 and 2002, roadway length increased by 80%, while railway length increased by only 11%. Passenger and freight transport shares in the year 1950 decreased by 1.6% and 4.5%, respectively, from 42% and 68%, respectively, due to the fact that existing infrastructure and operating conditions could not be improved, and new corridors could not be opened (Van Oort and McCann, 2009). The TINA Report of the EU in 2007 aims to develop the expanding union of transport networks in a highly integrated and integrated way and to ensure sustainable mobilization. It therefore constitutes an initial work for the free movement of goods, services and people. Another special purpose of the TINA Report is the unification of the transport systems and networks of Turkey in the process of integration with the EU and the presentation of a projection in this frame. The EU produces many alternative solutions such as TRACECA in transport. Within the scope of this project, the transport networks of a wide geographical area from Central Asia to Europe are being renovated and improved. Black Sea and Caspian Sea-oriented progeny, Eastern European countries integration into the Mediterranean. High-speed railway investments in Turkey, which is geographically active in TRACECA, are not considered independently from this project (Litman, 2013).

Turkey as well as for other transport types, as well as for the railway type 2023 and 2035 targets and a significant portion of the investment projections are high-speed railway lines. Therefore, a significant part of these improvements will be railway security in our transportation system, which generally needs improvements in traffic safety. The provision of security in the railways that will have a significant share of freight and passenger transport in the ongoing and ongoing investments will take an even heavier place on Turkey's agenda in the coming years. The first step in the development of high-speed railways; is to define the activities of the HSR Systems of the future and the sectoral possibilities to serve them. It; It means developing a deeper understanding of user needs, which must be started by identifying the main processes affecting transportation. These; Globalization, demographic change, information technology revolution and urbanization. These four trends are; Regions, such as urban clusters, economic development centers. These regions are; They are in violent competition in the name of economic development and development. The two key transport issues that impact regional competition are: Must have high-quality international connections (international airports and high-speed rail lines). Regions; to support a combination of intelligent modes of transport in order to increase livability (McArthur, 2010).

2. CONCLUSIONS

High Speed Railways is a technical innovation; has been unveiled with many developments integrated on 'traditional railroads' in order to create a faster and more efficient modes of transport (Nijkamp, 2008). Along with that; A reality in the world HSR is often operated on the same logic as traditional railroads, in other words, old-fashioned services are functionalized by wearing a new, faster look. This booster approach has been successful in many sectors. But; an innovative search for the Socio-Technical

System's social wing can reveal the development of more attractive and efficient services to daytime transport demands with integrated HSR networks (Kızıldağ and Tekin, 2017). An interesting trend in regional competition for economic development from the perspective of the High-Speed Railway Organizations is; Speed railways instead of flights for short and medium distances (Wang, 2016). In summary; The high-speed rail plays an increasing role in the redefinition of the regional driving force and the new driving force of economic development. High Speed Railway planners; It is necessary to show how the HSR system will improve development and improve the quality of regional life (Sak et al, 2014). It; The attraction of tightly integrated local transport systems with high-speed railways and the development of land use documents that maximize the value of high-speed rail investments. It is not only lean technical development but focuses on the removal of traditional barriers in the name of achieving the goals set forth at the same time. It is not possible to equip the entire market with HSR services. Therefore; Investments should be implemented according to detailed strategic plans. Railway companies think more strategically. For example; 'It does not just go faster, it's all how much speed is being made within the cost of investment and operation, as measured by how much the user is demanding in the context of competition with cars and airplanes (Langford et al, 2013).

Turkey; It fills in for a complete natural junction qualification in terms of its geographical location. Until recently, this is expressed as a 'bridge' in political culture (Dill and Rose, 2012). The social-political conceptualization of these qualifications is a separate and important issue, and it is certain that the geography of Turkey, which is a natural density and flow route, has a good management and direction of the supply-demand balance, redesign as a gathering- It requires a transportation engineering (Latorre et al, 2012). Turkey; Has a position in the center of the cultural geography of the world and is an important component of the Mediterranean Basin and many human basins at the same time. Our geography; The Caucasus, the Balkans, the Middle East, North Africa and Central Asia. The last political language to express this is; 'Being the largest economy of large human geography next to a border from Germany to Moscow, to Beijing, to New Delhi'. Even in this central location; We are reminded of the concepts of 'economy-politics-social culture' alone. All these main concepts are related to 'transportation management and urbanization' (Theure et al, 2012).

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