The Railway Transport System and its Implications in the Economic Development

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Abstract

A rail transport system is deemed in most countries a prerequisite for the overall economic development and, in this respect, considerable resources are allocated especially towards the railway installation and improvement, but also for the human resources system efficiency and optimization. Railways usually have an asset value that makes up a significant part of the national wealth and the rail sub-sector should bring a significant contribution to the GDP. It is therefore important and appropriate that this asset be managed professionally and that an increasing number of railway professionals are now encouraged to get involved in this activity. To clarify the impact transport has on the economy, several important research directions also strongly intercorrelated had been laid out in this paper: economic development, material goods production and distribution, influence on prices.

Key words: rail management, transport, economy, prices
J.E.L. classification: L92, O18

1. Introduction

Expanding the business activity internationally implies augmenting the complexity of its unfolding actions, and, above all, developing and diversifying the human resources management tools that they use to manage the cultural, economic, social, political and institutional variables influencing their activity at the level of each country. All these developments call the reconsideration of the human resources' strategic role at organizational level, people being deemed the main competitive advantage they possess. Management has a multidisciplinary character, integrating components belonging to the study subject of other areas: economic theory, mathematics, psychology, sociology, statistics, materials and information technology, etc. In particular, rail management aims to maintain and improve the existing rail network in order to allow its uninterrupted use via commercially exploiting traffic in an efficient and safe manner. Transport activity in all its forms is one of the most complex segments of the economy, but also a factor of great influence on the quality of life, hence the current concerns of the international bodies are oriented towards measures designed to develop effective transport systems compatible with the environment.

In agreement with a reputed specialist in said field, we feel that a country's economy is composed of three major sectors of activity: the primary sector founded on agriculture and farming products manufacture; the secondary sector, represented by industry along with all its subcomponents and the tertiary sector, respectively services. As a whole, the transport activity is part of the tertiary sector of the economy and entails moving the items entrusted to be transported, from a pick-up point to a drop-off point (Jaba, 2007, 120).

Regardless of their type, transports have the main purpose of meeting human needs in what regards traveling, serving the national and international economies, ensuring economic exchange, goods and people transportation. As a rule of thumb, the transportation demands concerning the economy and population are met by several technical transport systems: rail, road, water, air, pipelines. In the specialty literature in our country, the transport system is defined as the totality of

all infrastructures embodied by transit means and terminals, means of transportion and control systems that allow people and goods to be physically moved in due course in order for them to participate in a timely manner in a certain activity (Iancu, 2003, 9). The specific features of the railway transport activity carried out in our country are determined by the structure of goods transported, the diversity of the transport relationships, the means of transport used and their ownership form. The transport systems, being distinct and competitive, are organized as to contribute to fulfilling a combined transport on different distances: rail-road, sea-road, sea-rail, air-road, rail-by pipeline. The five basic modes of transport (rail, auto, maritime, air and pipelines) together with the necessary infrastructure and vehicles form the transport system, being unable to operate outside it.

2. Literature review

For a long time, it has been thought that the rail transport is the most complex and well-organized transport system, but with the skyrocketing development of the auto and air transport, things have been reconsidered, yet without questioning the importance of railways in the general transport system. This importance imposes the current and future need for the railway transport modernization in order to cope with the competitive pressure from the other modes of transport (Dăneci-Pătrău, 2013, 64).

In the specialty literature, the railway transport system is analyzed as a set of processes that attempt to optimize the overall performance of the railway operation management (Tănăsuică, 2003, p.74). The effects of rail transport are important because this mode of transport is an essential component of the economic and social development process, often absorbing an overwhelming proportion of national budgets. The strong correlation between the mileage completed and gross domestic product also adds its contribution to the developing of an economy via facilitating trade, both nationally and internationally; thus people's access to employment, education, health care and other services is improved.

In order to analyze the main activities and resources of the rail transport system, it is important to define the rail transport. In a narrow sense, it is a special type of service, in the sense that it can not be stored or preserved, being performed under special conditions when it has to deal with times of high demands. In the broad sense, railway transport means any movement of individuals and goods by use of rail vehicles by transport operators on the railway infrastructure (Şimut, 2001, 32).

The main activities of the railway transport are:

- The commercial operation of the transport of goods and persons.
- Maintenance and repair of the railway infrastructure.
- The commercial exploitation of the auxiliary patrimony.

One challenge for the rail management is to identify the best way to use railways as a mechanism to support economic and social development by effectively controlling the management of all types of railway activities. Rail management aims to maintain and improve the existing rail network in order to allow its permanent use through traffic commercial exploitation in an efficient and secure manner.

Railway infrastructure is technically defined as the assembly of elements required for the movement and handling of the rolling stock, railway station buildings with all related facilities, railway yards, bridges, tunnels, signaling, telecommunications and voltage installations meant for the railway transport (Buciumanu, 2002, 97). Railways are a salient element of railway infrastructure. Their most widely used classification is: Current rails, located between railway stations and rails within stations, which fulfill several roles for: circulating, maneuvering, connecting or pending.

Public or private rail transport operators are national companies or companies licensed to carry out public transport or transport for their own benefit of freight or passengers using the capacity of the railway infrastructure. In this regard, railway operators bear a railway infrastructure usage charge called IUC (TUI), which becomes its own income arising from the activity performed on behalf of the national company managing the railway infrastructure.

3. Main activities and resources of the rail transport system

The main purpose of transports is meeting human needs regarding traveling, serving national and international economies by ensuring the movement of goods, economic exchange. In the general trend of increasing railway operation speed, high-speed technology has been developed to overcome the nature, topography and social conditions. Recently, concerns about energy saving and environmental issues related to atmospheric pollution with gas emissions from cars (especially CO) associated to greenhouse effect resulted from ozone depletion, acid rains and life-traffic injuries have accelerated trends to revitalize rail transport, creating the future momentum needed to develop high-speed rail between major cities and for the dense population rails.

The studies drafted have made it clear that the most environmentally friendly means of transport is the railways. As a result of the review and protocol signed in Kyoto (10.12.1997), the European Union has agreed to reduce by 2022 its CO emissions by 18%. Comparing the energy consumption of different means of transport indicate a consumption 3.5 times higher for passenger car transport and double for the maritime transport as opposed to passenger rail transport (Şimut, 2001, 123). Regarding freight transport, the energy consumption for trucks is 8.7 times higher than in rail transport. The advantages of the railways take into account the transport of non-fuel electrified lines. In this respect, the case of Romania is presented, where the electrified network accounts for 33% of the total network, and the rail transport on the electrified network is 54% of the total transport. If the total land area occupied by the means of transport is taken into account, there results a ratio of 5% of the total area of the country; the area occupied by railways is 0.5%, compared to 4.5% covered by roads.

With a density of approximately 97 inhabitants/ km^2, Romania is among the middle-populated countries, hence additional land surfaces are difficult to obtain. From this point of view, the railroad requires a relatively small area compared to other means. A modern railway with two electrified lines has a width of only 14 meters, while a four-lane motorway with similar transport capacity requires an area double in size (31.5 m). To this advantage the impact on the environment must also be remembered, being less intense in the case of railroads compared to roads, as these have layers of non-environmental friendly materials applied.

Nowadays, about 120,000 people travel daily by train all over the country. Every day, around 200,000 tons of goods are delivered to the economic agents by railway. These realities make the Romanian Railways the seventh railway network in Europe in terms of traffic volume. Why do all these people prefer traveling by train to using their own cars or other means of road, aerial and maritime transport? Because they all know that the CFR safety indicators are superior to those of many other European railway administrations. For the Romanian railway operators, the safety of travelers and merchandise integrity are the most important aspects, sometimes prevailing in the face of timely deliveries or other transport services quality assessment parameters.

To identify the rail transport rank among the rail transport systmn in Romania, the evolution of the significant quantity indices related to railway infrastructure was assessed, their situation being illustrated in table 1.

Table no. 1 Quantity indices related to railway infrastructure

INDICES	M.U.	1998	2008	2018
Total length of the rail network	km	11348	11057	10820
Unfolded length of rails	km	22567	22247	20347
Electrified rail length	km	3680	3885	3971
Percentage of electrified rails	%	32.4	35.1	36.7
Rail network density	lkm/1000 km^2	47.8	46.7	45.8
No. of railway stations		1419	1100	978

Source: CFR SA National Company website, www.cfr.ro

The railway rolling stock consists of locomotives, railroad cars for goods and passengers transport. The locomotives provide the traction of freight and passenger trains on the traffic sections, as well as their maneuvering in stations. The total of locomotives in the track record

represents the inventory park for locomotives. The diversity of freight requirements has led to the emergence of several types of railcars with constructive and functional characteristics adapted to the nature of goods: uncovered, covered, clean, tank car, platform, and all these types of freight railcars together with passenger cars form the fleet inventory of railcars.

The railway network length index in our country presents, at the end of 2018, 36.7% of electrified rails of the railway network total length, constantly increasing since 1998 and a network density of 45.8 lkm / 1000 km^2 decreasing in recent years due to the network total length mitigation, which amounted 10820 km rail. At the same time, due to the rail transport activity cutback, the number of railway stations has fallen by one third over the last 20 years, from 1419 stations in 1998 to 978 functional units at the end of 2018.

Rail transport is the second mode of transport in the economy after road transport, as per the *transported goods* index, annually carrying about 50 million tons of goods out of the total of approximately 380 million tons, which represents approximately 13.4% of the market for freight transported in Romania, as you can see in Table 2. The market share of rail freight transport in Romania decreased from 17.1% in 2008 to 13.4% in 2018.

Table no. 2. Evolution of the market quota for the main freight transport types

Goods transported, of which: (%)	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
SNTF Freight	17.1	20	19.7	18.8	18.5	15.9	13.6	11.8	10.9	9.7	7.8
Private transport operators (OTF)	0	0	0.2	0.7	0.7	2.5	3.4	3.9	4.2	4.9	5.6
TOTAL railways	17.1	20	19.9	19.5	19.2	18.4	17	15.7	15.1	14.5	13.4
Road	75.8	73.5	73.7	73.7	74.3	74.6	75.6	77.6	78.8	79.5	77.8
Maritime	5.94	4.94	4.59	4.87	4.32	4.87	5.25	4.39	3.82	3.77	5.95
Aerial	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.3	0.2	0.2	0.4
Pipelines	1.06	1.36	1.71	1.83	2.08	2.03	2.05	2.01	2.08	2.03	2.45
TOTAL	100	100	100	100	100	100	100	100	100	100	100

Source: Ministry of Transport and Infrastructure website, www.mt.ro

During the last three years freight and rail transport has decreased steadily. The causes of these declines lie in the general decrease of the large enterprises production, the closure or liquidation of some economic agents due to the financial crisis, the fast shift of others to road transport with the activity dispersal to a large number of partners in small quantities and last but not least the decrease in family incomes due to budget cuts.

The direct consequence of the traffic decrease was the drastic cut of the railway companies collections, accentuated by the fact that the CFR tariff increases did not keep up with the inflation rate, especially for passenger tariffs.

Specific to the rail transport system is the existence of large masses of moving commodities containing significant amounts of kinetic energy. As the tendencies in rail transport speak of increasing tonnages and speeds, in order to ensure transport safety, the principle prohibiting two or more railway vehicles on the same traffic sector is respected.

4. Economic aspects of transports

Of the basics needed for a fundamental economic growth, we mention three of the most important: the transport system, a convenient source of energy and an efficient communication system. Since economic development implies large-scale production as well as its distribution within the area, operations that are not possible without effective transport, the conclusion to be drawn is that transport lies at the foundation of economic activity.

4.1 Transport and economic development

Market economy, characterized by the commodity exchange development, which involves transporting it from producer to consumer, depends on the availability of transport services. In areas of the world where transport is primitive, populations live at the level of a subsistence economy. They depend on the food resources, clothing and other products designed for living, provided by neighboring areas that produce only for local consumption, and the exchange of goods is totally random.

During the periods preceding the use of mechanical power, most of humanity depended on subsistence agriculture; exceptions to the rule were:

- Countries in the northern hemisphere, in the areas adjacent to the sea, where the shoreline configuration provides numerous natural shelters (ports) and the water courses were navigable also towards the interior of the continent, offering limited access; the progress of navigation allowed the development in these areas of the first buds of the market economy.
- Euro-Asian countries on the former "Silk Road" route, using camels for transport, created conditions for trade; the goods brought on camels from the Far East were taken over from the ports of the Near East by ships and brought to Europe.

At present, however, there are many areas of the globe (in Asia, Africa, South America) far away from the communications means, which for this reason have remained economically and socially far behind the favored areas. The economic development process is one of interaction between economic components; transport activity improvement stimulates progress in the economy, which is reflected in the transport field through its enhancement. The link between transport and communications is, at its turn, very close; the invention of telegraphy in 1840 has greatly accelerated the progress of rail transport, ensuring rigorous control of trains departures and arrivals. Phone and radio are two other great inventions of mankind that have contributed to the development of maritime and airborne transits. Wireless telephony through satellites got also applied in transport. It is clear that between transport and telecommunications there has always been a continuous mutual stimulation.

4.2 Transport and production

Transport has a fundamental role in the production process, which consists of changing the location of material goods in space and time. The classics of science have noticed that these processes can create value and obviously a certain kind of utility. Two notions that characterize transport in general were defined: the usefulness of place and the usefulness of time.

Usefulness of place or value creation by changing location of an object refers to the fact that raw material or the sub-assemblies of certain products are worth it only if they are moved to the place where they are needed. Production requires constant collection of various material goods, to a certain extent, in a certain place, in order to achieve a particular product. Transport is the factor that makes it possible to carry out production.

The usefulness of time refers to the fact that for the smooth running of production it is not enough that materials be moved from one place to another; it is very important that this is done in a certain time, optimal for the production process. Because, for various reasons, transport was not always done smoothly within the pre-established time, it was necessary to build up the stocks (storage of material goods near the place of use), which allowed the unfolding of production in conditions of transport discontinuity, but also of discontinuities specific to production.

In conclusion, large-scale production depends on the usefulness of place and time that characterizes transports. This is true for both large products and lighter and high value products that require special transfer conditions.

In the same order of ideas, transport contributes decisively to:

- Stimulating regional specialization, by ensuring the division of labor in space, regionally, but also globally; resources, climate, people's expertise vary from area to area, which makes the productive process to be characterized by great diversity; transport enables each region to specialize in the production they achieve best, which will lead to quantitative and qualitative

benefits under minimum costs.

- The location of productive activities by allowing for the costs transport operations so that they remain minimal.
- Determining production costs by taking into account the unavoidable expenses related to the transport activity.

4.3 Transport and distribution

Large-scale production must be accompanied by a mass distribution that moves products to different markets at a sustained pace. And in this area, transport creates usefulness of time and space. Every product acquires its value if moved to where it is desired and at the moment it is desired. Stocking of goods makes it possible to avoid over-saturation of markets and thereby maintaining prices, which is particularly important in seasonal production.

In this context, it can be concluded that the transport:

- Ensures the means to distribute the production outcome, making regional expertise efficient.
- Determines the increase of the sales markets.
- Sets the costs of product distribution operations, which will be part of the final value.

4.4. Transports and prices

As shown, transport operations are related to certain costs, which are part of the final product value. The rapport of transport costs varies in relation with the product characteristics; hence transport plays an important role for the price as follows:

- Ensure the stability of market prices; most varieties are not produced in equal amounts of time; in the absence of an adequate transport system, these products would be in excess in certain areas and at certain times of the year, which would add up to a substantial fall in price, while in other areas and time periods lack of products would be registered. The presence of a well-established transport system leads to balancing the supply of products in space and time with beneficial effects on price fluctuations.
- Supports promotion of low prices on the market by encouraging trade; the most productive areas, with the lowest prices (excluding transport costs), determine market prices; the other areas must align to these prices if they do not want to lose market share.
- Determines the value of land use, so that, by placing them further away from the transport routes, they obviously have a lower value and lower chances to acquire an important productive use.

The same appreciation can be extended over to any natural resource value that grows as it is closer to the major transport routes.

5. Conclusions

During the last three years freight and rail transport has decreased steadily. The causes of these declines lie in the general decrease of the large enterprises production, closure or liquidation of some economic agents due to the financial crisis, the fast shift of others to road transport with the activity dispersal to a large number of partners in small quantities and last but not least the decrease in family incomes due to budget cuts. The direct consequence of the traffic decrease was the drastic cut of the railway companies' collections, accentuated by the fact that the CFR tariff increases did not keep up with the inflation rate, especially for passenger tariffs.

Due to the lack of necessary funds, the public railway companies had to discharge some of the employees, limit expenses to the basic necessities for operation, reduce maintenance, repair and investment values in order to keep it steady. The price paid for this steadiness was, however, recorded in significant technical losses, resulting from the heavy wear and tear of all railway facilities, and while the share of budget revenues for transport infrastructure maintenance under the total revenues decreased, the degree of traffic safety on rail simultaneously declined, incurring direct consequences in the volume of services rendered.

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