

Natural, Technical and Material, and Infrastructure Resources of Romania

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Abstract

The paper contains the detailed presentation of Romania's endowment factors, respectively its natural, technical and material, and infrastructure (power, transport, and communication) resources. The presentation is completed by a SWOT analysis of all these components as parts of the national riches conditioning, in a decisive measure, the country's economic potential.

Key words: *natural resource, technical and material resource, national power system infrastructure, transport infrastructure, communication infrastructure*

JEL Classification: *E22, H54, O13*

Introduction

The natural-geographic factors, as well as natural, technical and material, and infrastructure resources a country possesses constitute its *endowment factors*, namely primordial elements conditioning, to a great extent, its economic potential, competitiveness level of its products and services traded on domestic and international markets, eventually its capacity to yield value added. The natural, technical and material, and infrastructure resources make up not only the raw material and energy basis for the whole economy of the respective country, and the technical and material frame of its economic and social activity, but, together with the natural and geographical frame, they constitute the natural environment of economic, social, and spiritual life of population.

Natural and Geographic Frame

This factor refers to territory dimensions, setting on the globe, climatic conditions, vegetation and fauna, soil and subsoil structure, hydrological resources.

Situated in the geographical center of Europe, on the Danube inferior stream and with the river mouth at the Black Sea, Romania is a country with a medium size of its territory (238,301 km², the twelfth country as size in Europe) and population (21,584 milion inhabitants, by 1 July 2006).

The relief presents three main levels, well-balanced dimensionally and concentrically disposed – the highest consisting of the Carpathian Mountains (31% out of territory), the medium one,

consisting of the Subcarpathian hills and tablelands (36%), and the lowest consisting of plains, river meadows, and the Danube Delta.

The climate is moderately-continental, with oceanic influences from West, mediteranian from South-West, and excessive continental from East. The average multiannual temperatures vary depending on latitude (8°C in the north of the country and more than 11°C in the south) and reference altitude (-2.5°C at mountain level, Peak Omu in the Bucegi Massif, and $11,6^{\circ}\text{C}$ at plain level, Zimnicea, Teleorman County).

The vegetation is arranged in tiers, differentiated depending on the relief and pedo-climatic characteristics: in mountainous regions – coniferous forests, beech forests, and mix forests (beech, pine, spruce fir); in hills and plateau regions – manyplies forests (beech, common oak, oak, Turkey oak); in plain, steppe, and silvosteppe – agricultural crop, specific vegetation in humidity deficit areas.

The fauna is diferentiated on species specific biotope areas and presents a considerable diversity, including also rare species (for instance, the chamois and the mountain eagle). The aquatic fauna is, also, diversified, some species becoming, however, scarcer and scarcer (for instance, the huck).

The soil, moulded during a very long period under the action of the climate and the living organisms on rocks, presents characteristics of fruitfulness on Romania's territory which grant it an outstanding biological potential for economic development, practically the whole territory of the country having economic utilization (economic useless or unutilizable plots of land have extremely limited surface).

The main ways of land stock employment in Romania, by 2006, were: total area of the land stock – 23,839.1 thousand hectares, out of which: agricultural area – 61.8% (arable – 39.6%, pasture land – 14.0%, hay field – 6.4%, vineyards and wine growing nurseries – 0.9%, orchards and fruit-growing nurseries 0.9%); forests and other grounds with vegetation – 28.3%, out of which: forests – 26.3%; constructions, roads and railways – 4.4,%; water courses and ponds – 3.5%; other areas – 1.9%. The weight of irrigated agricultural area by the National Administration for Land Improvement S.A. system in the total agricultural area was, in the same year, of 0.65% ¹.

The distribution of land stock by utilization categories is balanced, if relief, climate, and hydrographic network configuration are taken into account; it is worth noting that the weight of arable land in Romania's total agricultural area – 64.0%, is superior to that registered in the European Union – 55%, proving, once more, the outstanding natural potential the Romanian agriculture benefits from.

The subsoil of Romania's territory has a complex geological structure, particularly in the area of Carpathian Mountains range, that, in the context of tectonical phenomena taken place in lengthways time, determined the making up of a large range of metalliferous genetic accumulations – metamorphic, of metamorphic differentiation, liquid-magmatic metamorphosed, hydrothermal, sea-going. The output of these processes was the making up and concentration of complex chemical compounds accumulations, containing numerous useful elements – iron, manganese, copper, zinc, aluminium, chromium, barium, molybdenum, zircon, mercury, uranium -, as well as gold in native status. Romania's subsoil contains an outstanding variety of mineral substances, counting more than 130 substances, metalliferous and nonmetalliferous, accumulated in deposits of variable dimensions, most of them with small dimensions and poor prospects for economic exploitation; accumulations with a high degree of exploitation prospects are those hydrothermal and volcanic metamorphosed, containing significant quantities of lead, zinc, copper, gold and silver, as well as those of nonmetalliferous

¹ National Statistical Institute, *Romanian Statistical Yearbook 2007*, Bucharest, 2008, p. 515

minerals – salt, limestone, clay, gypsum, quartz, bentonite, graphite, kaolin. Exploitation of these resources has ensured the basis for some industrial activities development – chemical industry, and construction materials sectors -, setting up spa centers with therapeutical valences, capturing mineral water springs with curative features, etc.

The water resources represent hydrologic potential made up from the *interior rivers*, radially disposed, most of them having their springs in the Carpathians Mountains, *lakes* – natural and anthropic, *underground reserves* made up from phreatic waters, *the Danube river*, the main collector of interior rivers, and *the Black Sea*. These reserves are estimated by means of several indicators, i.e. *multiannual medium theoretic potential* (138,8 billion m³), *available potential in droughty years in natural regime* (92-109 billion m³), *utilizable potential depending on fitting out degree* (39.8 billion m³)².

The utilizable potential, consisting of surface and underground waters, in natural and fitted out regime, presents, from the economic standpoint, an obvious interest. The water reserves made sure, in keeping with fitting out degree, were, by 2006, of 40,398 million m³, out of which: surface waters – 33,806 million m³ (83.7%), and underground waters – 6,592 million m³ (16.3%).

The surface waters are divided into five quality classes – ranging from the very good quality (waters suitable for use in centralized supply network systems with drinking water, for ensuring animal and food industry consumption inclusively) to a bad quality – depending on monitoring output of hydromorphic biological, physical and chemical, main effluents, and other effluents evacuated in large quantities parameters -, in accordance with the law regulations in line with the European Union standards. The weights of surface waters quality classes, on the whole length of monitored rivers, were, in 2006, the following: class I – 29.8%; class II – 46.4%; class III – 16.5%; class IV – 5.1%; class V – 2.2%.

Subsoil Resources

In comparison with most of other member countries of the European Union, Romania has diversified and in some cases sufficiently rich subsoil resources.

Resources of metalliferous and nonmetalliferous ores are localized in deposits whose majority have modest dimensions, about 20 of them having a medium dimension, and four having large dimensions of nonferrous ores. Some deposits, even with a significant useful substance content, are not, for the time being, economically exploitable since they present specific genetical types of mineralization. The areas in which there is a significant potential of ferrous and nonferrous ores accumulations are the South Dobrogea (about 155 million t. of iron, reserves which can not be turned economically to account with actual technologies), the Eastern Carpathians (126 million t. of iron, as well as notable quantities of copper, lead, zinc, manganese), the Meridional Carpathians, including the Banat Mountains (78 million t. of iron, copper, lead-zinc, and manganese), and the Western Mountains (32 million t. of copper, lead-zinc, iron, gold, silver, and manganese, with diversified mineralization, and, locally, with gold-silver, copper, and lead-zinc concentrations)³. In a far-reaching strategy of extraction technologies improvement, the mineral deposits of titanium, zirconium, quartz, etc. from alluvia accumulated in the Danube Delta and the Black Sea seacost, and in some accumulations lakes situated on interior rivers, will be exploited.

² See A. Iancu, “Romania’s natural-geographical factors”, in: *Romania economic development. Competitiveness and integration into the European Union* (coord. A. Iancu), Romanian Academy, Section of Economic, Juridical Sciences, and Sociology. Romanian Academy Publishing House, Bucharest, 2003, p. 158.

³ Idem, pp. 147-148

In volcanic mountainous regions there are numerous mineral water springs with varied concentrations of iodine, potassium, iron, carbon dioxide, etc., with outstanding curative properties, which can be bottled and turned adequately into account.

In the category of subsoil resources are included also the energy resources, dealt with below.

Soil Resources

Unlike subsoil resources, determined by geological processes, the soil resources – agricultural, forestry, and water – are the output of action of a biological, geological and chemical processes widely related to climate and live organisms' influence on rocks, in specific temperature and climate conditions.

Destinations of land stock use were already presented, proving the existence of a valuable biological potential and almost total utilization of existent stock, the arable agricultural area having the highest weight – 39.6% among different utilization ways. This reality is confirmed by the agricultural areas distribution into five classes of yielding (which represents the areas aptitude for a certain agricultural use with optimum efficiency, this framing depending on their productive potential); by 2001, for instance, the weights of yielding classes were the following: class I – 3.8%; class II – 35.7%; class III – 25.1%; class IV – 18.4%; class V – 17.0%⁴. Most of the arable areas are framed in the second and third classes, an outstanding biological potential, engendered by black earth presence, being present in the Romanian Plain, the Banat Plain, the Crisana Plain, the low plateaux of Transylvania and Moldavia, as well as in some depressions. In 2006, the distribution of under crop areas on the main crops was the following: total under crop area – 7,884 thousands ha., out of which: grains for seed – 64.9% (wheat – 25.5%, maize – 32.0%), industrial plants – 16.9% (textiles – 0.03%; oleaginous – 16.5%); vegetables – 3.6%⁵.

As far as the forestry stock is concerned, the weights of different forest categories are the following: leafy – 70.0%; resinous – 30.0%; with protection role – 50-60%. The yearly lumber potential of forests is of 12-14 million m³, the structure of reaping wood volume being, in 2006, the following: resinous – 36.7%; beech – 31.9%; oak – 10.4%, different hard species – 12.2%; different soft species – 8.8%⁶.

The water resources, whose potential was briefly presented above, have an unsatisfactory multiyearly average level and sometimes show considerable variations of water flows (for instance, the proportion between minimum and maximum is, for the Danube river, of about 1/10, and in the case of interior rivers, of about 1/200, for some water streams this reaching to 1/2000)⁷. In the last years, the flows variations were amplified by climatic changes, deforestation actions on large areas, and harmful ecological processes, that require firm and consistent actions for careful management of deposits made up from phreatic waters, including those from the natural lakes, as well as setting up new water deposits in the shape of anthropic, accumulation lakes.

Energy Resources

The natural energy potential of the country is still significant, although, in the last three decades, energy resources reserves and production knew a continuous decline, particularly in the traditional extractive zones, turning Romania into an importer who covers from foreign sources approximately 37% of its necessary energy. However, Romania continues to have a significant

⁴ National Statistical Institute, *Romanian Statistical Yearbook 2001*, Bucharest, 2002, p. 42.

⁵ National Statistical Institute, *Romanian Statistical Yearbook 2007*, Bucharest, 2008, p. 519.

⁶ Idem, pag. 514.

⁷ *Treatise of contemporary economics* (coordinator T. Postolache et al.), Volume 2, Book I, Political Publishing House, Bucharest, 1987, p. 335.

presence on the European energy market, covering about 0.2% of the world crude oil production, 0.8% of coal, 0.55% of natural gas, and 0.4% of electrical energy.

In the internal balance of primary energy resources, the weights of different resources were, in 2006, the following: hydrocarbons – 33.8% production + stock and 28.4% import, out of which: crude oil – 11.9% production + stock and 18.2% import, and gas – 21.8% production + stock and 10.2% import; coal and coke – 15.8% production + stock and 5.7% import; other resources – 7.3% production + stock; oil petroleum products – 2.7% import; hydroelectrical and nuclear-electrical energy – 6.2% domestic production + stock; electrical energy from import ⁸.

The hydrocarbon exploitable reserves diminished considerably in the last decades, the contribution of geological researches to their cognition being more and more reduced, the rates of the new reserve discoveries being significantly below those of yearly exploitation, taking into account the sharp decrease of the latter.

The remedy of this situation implies firm actions oriented in two main directions: first, increasing final recovery factor of the crude oil from deposits which, in Romania, presents values significantly below those registered in other countries using modern adequate technologies; and second, intensifying efforts devoted to discovering new crude oil and gas deposits, in new zones and greater depths (according to the US Geological Survey estimations, Romania would have reserves of approximately 200 million tons of crude oil, and about 4,000 billion m³ of natural gas, placed to more than 4,000 meters and in complex geological structures, requiring advanced extraction technologies).

Coal continues to represent a viable power alternative, from the production and, especially, reserves point of view, the deposits from which can be exploited lignite (about 2.6 billion tons) and pitcoal (about 0.7 billion tons) ensuring the production, at the current level, still for about 100 years.

Difficult conditions for pitcoal extraction (great depths of extraction, bulky high floods, etc.), low calorific power of the Romanian coal, ash, sulphur, and moisture high content, taking out large areas from agricultural circuit for scraping, road works, localities evacuations, etc. are peremptory arguments which plead for the strong limitation of coal extraction and turning to alternative solutions.

Hydroenergy has, also, an important role in the country's power balance, the installed power increasing from 60 MW in 1960 to 6,281 MW in 2006, as a result of beginning construction and operating with large hydroenergy complexes and hydroelectric plants on Danube, Arges, Olt, Bistrita, etc., fitting out of numerous micro-hydroelectric plants on interior rivers, etc. During the period 2001-2006 only, hydroenergy production increased from 14,023 to 18,355 million KWh, and there are still numerous possibilities of fitting out new hydroenergy plants on interior rivers.

Since 1997, nuclear energy began to have a significant presence in country's energy balance (at the beginning, about 10%), when the first group with an installed power of 700 MW started its running at the Nuclear-Electric Power Station Cernavoda. The power station is supplied with both nuclear combustible and heavy water from domestic production; the uranium deposits identified on the national territory can ensure the supply of the power station, even in the variant of its extension to four groups, for approximately two decades.

During the period 2001-2006, total power resources and those from domestic production had evolutions illustrated by the figures presented below.

⁸ National Statistical Institute. Romanian Statistical Yearbook 2007, Bucharest, 2008, p. 645

Table 1. Total power resources and power resources from domestic production, 2000-2006

- thousand tons equivalent crude oil –

	2000	2001	2002	2003	2004	2005	2006
Total primary energy	40,360	42,664	43,992	45,377	47,137	47,289	47,627
Production	28,106	27,994	27,668	28,192	28,026	27,090	27,065

Source: National Statistical Institute, Romanian Statistical Yearbook 2007, Bucharest, 2008, p. 659

The reduction of primary energy resources production engendered, naturally, the lowering of country energy independence degree, both on the whole and the main energy resources categories, reality demonstrated by the figures presented in the following table.

Table 2. Degree of Romania power independence, 2001-2006

	2001	2002	2003	2004	2005	2006
Total *	73.7	75.8	72.2	71.8	71.4	68.4
Coal (inclusiv coke)	76.4	69.4	68.7	67.5	66.3	67.9
Crude oil	52.2	48.5	52.0	43.4	37.8	35.9
Natural gas **	81.8	77.9	68.7	74.1	69.0	64.8

* Inclusively power products got and consumed in the households.

** Exclusively gazolene and ethane from extraction oilfields, which are included to crude oil.

Source: National Statistical Institute, Romanian Statistical Yearbook 2007, Bucharest, 2008, p. 660.

Thanks to the power resources Romania still has at its disposal, the country power independence degree is superior both to that of many countries in the European Union and to its average.

What is to be appreciated, although the evolution took place to a smaller scale than the desired and possible one, the dynamics of production, transport, and distribution of electric and thermic energy, gas and water decreased during the period 2000-2006, in contrast with that of gross domestic product (GDP) and industrial production, which followed an ascending line, with significant increasing rates. This reality, which means reduction of pressure on power resources, should be related to the diminution of the pressure on the power resources, occurred as a result of the restructuring achieved within it, and, particularly, within manufacturing industry, demonstrated by the different evolutions of the mentioned three indicators, shown in the table below.

Table 3. Comparative dynamics of the gross domestic product (GDP), manufacturing industry production, and production, transport, and distribution of electric and thermic power, gas and water, 2000-2006

	2000	2001	2002	2003	2004	2005	2006
GDP	100	105.7	111.2	117.0	126.9	132.2	142.5
Manufacturing industry production	100	109.8	116.9	121.1	128.8	132.1	142.4
Production, transport, and distribution of electric and thermic power, gas and water	100	97.1	93.8	95.4	92.3	90.9	94.9

Source: National Statistical Institute, Romanian Statistical Yearbook 2007, Bucharest, 2008

The figures lead to the conclusion that Romania's power resources, although in a sharp quantitative and qualitative decline, still ensure a certain degree of power independence, and have some amplification prospects, which can be turned into good account by adequate ample actions – intensifying prospectings and geological explorations, completion of the Nuclear-Electric Power Station Cernavoda with two other power groups, possibly construction of a new nuclear power station, fitting out new hydro-electric power stations and micro hydro-electric power stations on interior rivers, superior turning into account renewable resources potential.

Technical and Material Resources

This kind of resources find themselves the best illustration into *tangible assets*, whose material equivalent are *fixed assets* (land, buildings, special buildings, machinery and equipment, installations).

The tangible assets present, by national economy activities, extremely various levels, those from the public administration and defence being, from afar, the most solid, at a distance being situated transport, depositing, and communications, then constructions and commerce, according to the figures shown in the next table.

Table 4. Structure of fixed assets, by national economy activities, 2001-2006

Activities (CAEN Rev. 1 sections)	2001	2002	2003	2004	2005	2006
TOTAL	100	100	100	100	100	100
Agriculture, hunting, and forestry	1.5	1.4	1.3	1.4	1.4	1.5
Industry (inclusive electric and thermic energy, gas and water)	45.2	41.5	22.1	29.9	29.1	27.5
Constructions	2.4	14.4	6.7	8.5	8.1	7.9
Commerce	4.6	5.9	2.9	5.1	5.5	6.8
Hotels and restaurants	0.7	1.0	0.6	0.9	1.0	1.2
Transport, depositing, communications	10.6	10.2	5.7	7.9	7.9	8.3
Financial intermediateness	1.9	1.8	1.0	1.4	1.4	1.5
Real estate transactions and other services	2.1	2.1	1.2	2.5	3.4	4.0
Public administration and defence	30.1	21.1	57.9	41.4	41.2	40.4
Education	0.3	0.1	0.1	0.1	0.1	0.1
Health and social assistance	0.2	0.1	0.1	0.1	0.1	0.2
Other activities of the national economy	0.4	0.4	0.4	0.7	0.7	0.6

Source: processing data from the National Statistical Institute, Romanian Statistical Yearbook 2007, Bucharest, 2008, p. 469

In the analysed period, significant changes have taken place in the fixed assets structure on national economy activities, as a result of varied dynamism of investments made in different activities. The most dynamic activities in the analysed period, from the standpoint of fixed assets volume growth, proved to be commerce, real estate transactions, health and social assistance, education; growths realistic judgement, many spectacular, requires however the taking into account the poor basis they referred to.

The fixed assets knew also, by industrial activities and manufacturing industry activities, substantial changes, some positive in the sense that they increased in certain activities of medium and high technology (IT and office means, means of transport non included in road transport, waste recovering, crude oil processing, coal coking and nuclear fuel treatment, etc.), at a faster pace than the increases registered by other sectors with pollutant productive activity, energy-intensive, with a low level of the value added (metallurgy, chemical substances and products) – see the figures in the next table.

Table 5. Fixed assets dynamics on industrial activities, 2006/2000

Activity (CAEN Rev. 1 divisions)	2006/2000 (%)
Total	185.0
Extractive industry	189.1
Coal extraction and preparation	152.6
Hydrocarbons extraction and annexed services	190.3
Metalliferous ores extraction and preparation	262.3
Other extractive activities	274.9
Manufacturing industry	219.9
Food and beverages	289.7
Tobacco products	166.1

Table 5 (cont.)

Textile products	282.2
Clothing articles	236.7
Leather goods and footwear	301.8
Wood and wood products processing (except furniture)	225.1
Pulp, paper, and paper products	278.3
Publishing houses, polygraphy, and recording reproducible registrations	307.8
Crude oil processing, coal coking and nuclear fuel treatment	336.2
Chemical substances and products	207.2
Rubber and plastic products	241.9
Manufacturing of construction materials and other products of nonmetallic minerals	250.1
Metallurgy	113.0
Metallic constructions and metal products	305.0
Machinery and equipment (except electrical and optical equipment)	228.3
IT and office means	562.7
Electric machinery and appliances	276.7
Radio, TV and communications equipment and apparatus	173.8
Medical, precision, optical, and watch-making instruments and apparatus	228.6
Means of road transport	192.3
Means of transport non included in road transport	435.9
Furniture and other industrial activities non elsewhere classified	323.5
Waste recovering	356.7
Electric and thermic energy, gas and water	146.2
Production, transport, and distribution of electric and thermic energy, gas and warm water	139.4
Water collecting, treatment, and distribution	183.1

Source: National Statistical Institute, Romanian Statistical Yearbook 2007, Bucharest, 2008, p. 472

In the context of modern economy dynamism, the fixed assets renovation (namely removing those physically used and obsolete) presents a particular importance, beside the introduction of technological progress elements. In 1989, the coefficient of fixed assets renovation was only 7.5%, it increased to 63.1% in 2000, and decreased to 29.6% in 2005, these figures highlighting the fluctuation of investments made for the economy technical basis modernization, and underlining the imperious necessity to continue actions in this respect.

Infrastructure Resources

Infrastructures – of electric power, transport, and communication – of a country are a prime importance factor conditioning its economic and social development, and constitute, simultaneously, at an adequate density and qualitative level, an essential *location advantage*, able to stimulate the domestic investors' interest and to attract substantial foreign direct investments.

1. Infrastructure of the national power system

At the end of 2006, the installed power was of 19,313 thousand kW, out of which thermal energy – 13,032 thousand kW, and hydraulic energy – 6,281 thousand kW. Although there is a significant production capacities surplus, the installed power per inhabitant was of 895 kW, level much inferior to that registered in most of the European Union countries.

The number of power plants working on fossil fuels was of 36 thermoelectric power stations and of 5 thermal power stations. The status of installations' physical and moral wear is advanced enough, since from the total installed power of these stations about 75% represent groups with more than 20 years oldness, approximately 24% with the oldness comprised between 11-20 years, 0,75% with the oldness comprised between 6-10 years, and 0.75% - between 1-5 years.

The cogeneration production power plants (electric and thermal energy) totalized, by 2005, 3,886 MW, out of which 48.7% of the capacities being more than 30 years old, and 8.1% - being below 10 years old.

There are 129 hydroelectric power stations, with an installed power of 6,086 MW; they can supply 16,080 MW yearly, in average hydrological conditions. The powers installed in equipment are comprised between 5-190 MW, about 37% of them having overfulfilled their service life.

In the field of nuclear-electrical power, the Cernavoda Station will have, according to the project, an installed power of 3,500 MW (five groups of 700 MW each). At present, two groups are running, the complete project achievement aiming to ensure country's power independence, depending on the possibilities of domestic production of nuclear fuel, heavy water, and most of necessary equipment.

With regard to electrical energy transport infrastructure, the network comprises 77 electrical stations with tension voltage of 750 kV, 400 kV, and 220 kV, with a total installed capacity of 36,1 GVA, electric lines with tension voltage of 750, 400, and 220 kV, as well as interconnexion electric lines of 110 kV with neighbouring countries' power systems. The electric power distribution network includes 18,300 km of high tension voltage (110 kV) electric lines, 117,000 km of medium, and 170,000 km of low tension voltage, 1,222 stations of 110/M.T. and stations of M.T./M.T., as well as 61,754 transformer posts and energy supply points.

2. Transport infrastructure

It is relatively poor developed, despite Romania's advantageous geographical position, situated at the crossroad of the paneuropean transport highways connecting the north and the south of Europe and the East and the West of the continent. The present status is the logical result of the lack of substantial investments in the last 50 years, and it constitutes a drawback which seriously affects the country's economic development.

At the 2006 end, the Romania transport infrastructure appeared as follow:

- *railway transport*: railway lines in exploitation 10,789 km, out of which: electrified 3,965 km.
- *road transport*: public roads 79,952 km, out of which: modernized 21,549 km;
 - out of total public roads:
 - national roads (inclusively highways and European roads): 15,983 km;
 - district and communal roads: 63,969 km.

Density of public roads / 100 km² territory 33,5 km.

- *river transport*
 - The Danube is entirely navigable on the Romanian territory – 1,075 km.;
 - Danube – Black Sea channel - 64 km.;
 - 13 river harbours for goods transport and 5 more important for passenger transport;
- *marine transport*: harbour infrastructure for high tonnage vessels at Constanta, Mangalia, and Sulina;
- *air transport*: 17 airports, among the most important are: Bucharest Otopeni (almost 75% out of total traffic), Bucharest Băneasa (9.3%), Timișoara (5.2%), and Constanța (2.2%), operating under the Transport Ministry authority, while other 13 operate under the district council authority. All airports are open to international traffic, on 9 taking place regular international flights.

Besides these public infrastructures there is transport means park, which, at the mentioned date, consisted of the following items: *in railway transport* - 1,982 railway engines, out of which 751 electric and 1,105 Diesel engines; 55,503 wagons for merchandise transport and 5,522 wagons

for passenger transport; *in road transport* – 22,663 buses, 17,755 minibuses, 3,603,437 motor cars, 545,300 merchandise motor vehicles; *in river transport* - 246 tow boats and pushers, 60 vessels for passenger transport and 1,207 vessels without propeller for merchandise transport; *in marine transport* - 35 vessels, out of which one ore carrier and 8 tankers; *in air transport* - 57 aircrafts with 4,419 seats.

At present, the Romanian transport infrastructure development is accomplished in accordance with the European Union standards, pursuing, at the same time, its harmonious and coherent joining with transport infrastructures of neighboring countries. To this end, 12 national roads have been included in the pan-European transport network, as a result of ratification, in 2004, of the European Agreement upon the highways of international traffic. At the European level, with a view to establishing development priorities of transport infrastructure, corridors, supplementary transport axis, and marine pan-European zones were defined, which will make up the European transport network.

Concerning *the railway infrastructure*, this should be developed further on, given the conspicuous advantages presented by the railway transport. The technical status of railway infrastructure is, from qualitative and exploitation safety standpoint, critical, because of the drastic decrease in the last decades of maintenance expenditures, insufficiency and antiquation of rolling stock; insufficiency of necessary funds was emphasized by un-rhythmic payment of due sums by railway operators for infrastructure using. Therefore, it is necessary to continue and speed up the modernization and rehabilitation process of railway infrastructure, in order to line it up to the European performance, comfort, and safety standards.

As regards *the road infrastructure*, it the following aspects should be highlighted: increase at a slow pace of public roads length, which, by their features, can ensure a superior quality of road traffic; maintaining at a very low level of highways length weight (0.29%) and European roads (7.40%) in total length of public roads; the spectacular increase of newly matriculated motor cars every year; growth faster trend of road traffic, in comparison with road infrastructure increase pace; relatively uniform distribution of public roads network on development regions, provided that the Region Bucharest-Ilfov are not taken into consideration, in which, thanks to the Capital, the density is higher; the poor level of public roads density (33.5 km/100 km² territory) in comparison with the average of the European Union countries (116 km/100 km² territory).

The specific *river transport* infrastructure lies in an ample modernization process, imposed by the re-orientation of a great part of economic environment towards transport necessities satisfaction by river, cheaper and less polluting than other transport types.

Another intense modernization effort aims at the *air transport* infrastructure, namely airports and their due structures, as well as aircrafts stock.

3. Communication infrastructure

At the end of 2006, this infrastructure included: 163 public broadcasting stations and 535 private stations; 449 public television stations and 174 private stations; 200 television translators; 7,079 post and telephony offices, out of which 6,120 in rural localities.

As regards the communication infrastructure, Romania managed to reduce the existent gaps only to a lower extent for the time being, given the situation of most of the European Union country members, the lagging behind in this respect being still conspicuous. As concerns the information society implementation on the basis of development of TIC industry, its related infrastructure (hardware, software, communication means), and specific applications and services, intense efforts are further on absolutely necessary, particularly with a view to the infrastructure reserve rise from the standpoint of its access and utilization cost.

Conclusions

The synthesis of the above discussed aspects is presented as a *SWOT analysis*, as follows:

Table 6. Specific strengths, weaknesses, opportunities and threats of Romania's natural, technical and material, and infrastructure resources

Strengths	Weaknesses
<ul style="list-style-type: none"> ○ Advantageous geographical country position, at the crossroad of pan-European transport thoroughfares ○ Excellent natural-geographic frame, with relief forms diversified and balanced from the territorial standpoint, moderately-continental climate, diversified and abundant vegetation and fauna, soil with diversified and balanced destinations, agricultural lands with appreciable fertility features, subsoil containing an appreciable variety of raw material and energy resources, water reserves well-balanced disposed in territory and, for the time being, sufficient ○ Existence of raw material and energy resources in quantities still significant and with acceptable quality ○ Good quality of crude oil and natural gas from domestic production, their still high weight within the domestic resources of primary energy ○ Costs of crude oil and natural gas from domestic production sensibly under their commercialization price on international markets (crude oil – with approximately 30%, natural gas – with about 40%) ○ Reserves with durable prospects, at the present production level, of lignite and pitcoal ○ Significant hydropower resources, with growth prospects ○ National power system infrastructure sufficiently developed, balanced from the territorial dispersion standpoint ○ Diminution of pressure upon power resources, as result of economy power-intensivity reduction, respectively of restructuring which took place within it, and, first of all, in industry ○ Changes in orientation of investments in industry, re-directed increasingly towards medium and high technology activities, with great value added ○ Existence of a significant fixed assets stock, with large differences among endowment of national economy activities ○ Positive changes in technical structure of transport means, with beneficial effect on tariffs and transport conditions 	<ul style="list-style-type: none"> ○ High degree of energy resources deposits depletion, particularly of hydrocarbon deposits ○ High extraction costs of crude oil and natural gas, low profitableness of supplementary investment ○ Insufficiency of total volume of underground gas storage deposits, scanty status of them from the safety standpoint ○ High level of technical equipment wear in pitcoal exploitations ○ Low qualitative parameters of coal deposits ○ Exhaustion of easy accessible and economic exploitable uranium deposits ○ Permanent reduction of country's power independence degree ○ Economy's power-intensivity still high ○ Poor state of country's hydrological fitting out, a good part of the national territory presenting a high risk of frequent floods, and other part – of repeatable droughty periods ○ Insufficiency and poor status of the national irrigation system ○ Relatively low level of fixed assets renovation ○ Insufficiency of investment devoted to technical and productive apparatus modernization ○ Deeply scanty status of transport infrastructure, particularly of railway and road ○ Transport means stock in part physically worn out and obsolete, increase much faster of transport means number (particularly of motor cars) as compared to the pace of transport infrastructure modernization ○ Communication infrastructure much inferior from quantitative and qualitative standpoint to that existent in most of the European Union country members

Opportunities	Threats
<ul style="list-style-type: none"> ○ Attraction of strategic foreign investors for intensification of prospecting and geological exploration works in new zones and at greater depths, regarding hydrocarbon deposits ○ Making legislation more pliant as regards the concessions and custom taxes regime, in order to attract strategic foreign investors ○ Development of natural gas trans-border trade, conjugated with increase of natural gas underground storage capacities Diversification of import hydrocarbon supply sources Continuation of privatization process, particularly with strategic foreign investors, of power production and distribution stations ○ Access to the European funds for infrastructures development ○ Extension of initiatives at the level of local public administration authorities regarding the turning superior into account natural resources of the zone infrastructure modernization, economic development in unfavoured zones, stimulating public-private partnership in achievement of economic development projects, etc. 	<ul style="list-style-type: none"> ○ Exhaustion of hydrocarbon deposits in exploitation growing unbalance of hydrocarbon and oil petroleum products with covering production from new deposits ○ High wear degree of the national crude oil and oil petroleum transport network ○ Zonal geographic and strategic interests divergent with that of Romania as regards international gaspipelines and oilpipelines routes crossing the country ○ Delays in transport's infrastructure development and modernization ○ Instability of legislative frame as particularly for property regime, concessions regime, and taxes ○ Continuation of deforestation actions, soil degradation and desertification phenomena, irrigation system degradation, which will worsen climatic changes and amplify their negative effects

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Resursele naturale, tehnico-materiale și de infrastructură ale României

Rezumat

Articolul conține prezentarea detaliată a înzestrării cu factori a României, respectiv resursele ei naturale, resursele tehnico-materiale și cele de infrastructură (energetică, de transport și de comunicații). Prezentarea este încheiată cu o analiză SWOT a tuturor acestor componente ale avuției naționale care condiționează, în măsură determinantă, potențialul economic al țării.