

GEOSTATISTICAL ANALYSES OF COMMUNICATION ROUTES IN A GEO-STRATEGIC AND REGIONAL DEVELOPMENT PERSPECTIVE

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Abstract. Accessibility is a key concept in regional development, with numerous ties to territorial cohesion and polycentricity. Moreover, it also exhibits a geo-strategic function, anchored in the international relationships between countries and continents. The article reviews several case studies, placing analyses of the Romanian accessibility in a broader context. The results show that regional development, overall EU connectivity and possible transit fluxes are prevented by the configuration or lack of communication routes. Increasing the accessibility of regions must be a priority of governments, regardless of political opinions. It is expected that the transition of economy to post-carbon era or other models – green economy, knowledge-based economy etc.) – to result into the emergence of new poles and axes of development, and ensure transport sustainability.

Key words: cohesion, polycentricity, accessibility, sustainability, EU.

1. The spatial perspective

From a spatial perspective, European development is governed by two principles: cohesion and polycentricity. Territorial cohesion aims to balance the distribution of human activities across the Union, complementary to economic and social cohesion and putting the goal of

sustainable and balanced development into a territorial perspective (Doucet, 2006; Faludi, 2004; Davoudi, 2005). A polycentric urban system is a spatial organization of cities characterized by a functional division of labor, economic and institutional integration, and political cooperation, and defined by two

complementary aspects: morphology (distribution of urban areas in a certain territory - number of cities, hierarchy, and distribution), and relations between urban areas (flows and cooperation) (Meijers, 2008; Tewdwr-Jones and Mourato, 2005). For this particular reason, there are three levels of European polycentricity: macro - the model is an alternative to the "Pentagonal" London, Paris, Munich, Milan and Hamburg (14% of EU27 area, 32% of population and 43% of the Gross Domestic Product), mezzo - regional level, where two or more cities are complementary providing to the people and companies in common areas access to urban functions that normally characterize only a city of higher rank, and micro - intra-regional level where complementarities of urban and economic functions are strengthened by the grouping of settlements (Tache *et al.*, 2016). Last but not least, even a city or settlement can be polycentric. Differences in the development of administrative units are the start of territorial development; the process starts with eliminating discontinuities by translating them to the periphery and overlapping against the limits of the overall space (Graham and Hart, 1999; Ianoș and Heller, 2006; Benedek, 2015).

For this purpose, regional development pays a special attention to profoundly disadvantaged areas, defined by the spatial contiguity of at least five administrative units, a mean value of the global indicator of development 25% lesser than the average per integrating region or 75% below the level of the region of development, levels of at least one elementary indicator close to the minimum national or macro-regional value, and negative territorial impact on all neighboring areas (Ianoș and Heller, 2006; Saraceno, 2013; Ianoș *et al.*, 2013;

Florescu and Mitrea, 2015; Sîrodoev *et al.*, 2015).

Flows are generally related to proximity, tying polycentric development to accessibility, which in its turn is connected to economic development (Popescu and Petrișor, 2010), since a good accessibility of European regions improves not only their competitive position but also the competitiveness of Europe as a whole (Petrișor, 2010). The main problem in achieving this goal is accessibility. Accessibility indicators describe the location of an area with respect to opportunities, activities or assets existing in other areas and in the area itself; in the European Union, the most common indicator of accessibility is the 45 minutes isochrone, meaning the areas that can be reached by specific means of transportation within 45 minutes (Petrișor, 2010).

2. The geo-strategic perspective

From a geo-strategic perspective, accessibility is related to the development of pan-European corridors fixed in their final form at the 1997 Third Pan-European Conference in Helsinki (Peters, 2003). Nevertheless, the vision is not contained to the European space, as the TRACECA transport corridor system, reaching from Southeast Europe into Central Asia across the Caucasus, is also seen as part of the European policy of development (Gorshkov and Bagaturia, 2001; Fleisher, 2005). The concept 'euro-corridor' was developed in two Pan-European Transport conferences in Prague, 1991 and Crete, 1994 (Ghițuleasa and Ghițuleasa, 2013). The design and creation of a whole-European coordinated transport network is based on the Trans-European Network (TEN), which became the main tool to meet the EU objective of Common Transport

Policy (Owens, 1995). In more detail, the transport networks (TEN-T) were created to improve economic and social cohesion in the EU, reduce regional disparities, promote cities as motors of regional development and improve global competitiveness of the EU as a region, or, in a broader sense, to meet the goals of the Lisbon agenda (Peters, 2003; Šakalys and Palšaitis, 2006; Fabbro and Mesoletta, 2010). The corridors include cross-border road and rail traffic routes between the EU15 and the Central and Eastern European countries, but also airport, sea and river ports; the ten corridors are (Ghițuleasa *et al.*, 2010, 2011):

- (1) Helsinki - Tallinn - Riga - Kaunas - Warsaw: includes road corridor Tallinn - Riga - Warsaw, rail corridor Tallinn - Riga - Warsaw, and branch Riga - Kaliningrad - Gdansk
- (2) Berlin - Warsaw - Minsk - Moscow - Nizhny Novgorod
- (3) Dresden - Wrocław - L'viv - Kiev
- (4) Dresden - Prague - Vienna - Bratislava - Budapest (branches to Nuremberg, Bucharest - Constanța and Sofia - Thessaloniki / Istanbul)
- (5) Venice - Trieste - Koper - Ljubljana - Budapest - Uzgorod - L'viv: includes branches A: Bratislava - Kosice - (Uzhgorod) - L'viv, B (road): Rijeka - Zagreb - Cakovec, B (railway): Rijeka - Zagreb - Koprivnica - Dombovar, C: Ploče - Mostar - Sarajevo - Osijek - Budapest
- (6) Gdansk - Grudziadz/Warsaw - Katowice - Zilina (branch to Brno)
- (7) Danube: includes Danube inland waterway, Black Sea-Danube Canal, Danube branches Chilia and Sulina, Danube-Sava canal, Danube-Tisza canal, and relevant port infrastructures situated on these inland waterways
- (8) Brindisi - Durres and Vlore - Tirana - Skopje - Sofia - Varna and Burgas,

with three branches: Cafasan - Kaphstice/Kristallopigi, Sofia - Pleven - Byala (road)/Gorna Oriahovica (rail), and Burgas - Svilengrad - Ormenion

- (9) Helsinki - St. Petersburg - Pskov/Moscow - Kiev - Ljubasevka - Chișinău - Bucharest - Dimitrovgrad - Alexandroupolis
- (10) Salzburg - Ljubljana - Zagreb - Beograd - Nis - Skopje - Veles - Thessaloniki (branches to Graz, Budapest, Sofia and Florina).

If the German example is analyzed, it is important to stress out that an efficient infrastructure is regarded as a precondition for the national sustainable development, and achieved by developing the rail corridors from east to west [...], among other things, with the transport projects "Deutsche Einheit Schiene" (German Unity Rail)", but also by connecting the federal infrastructure to the European one (Moss, 2008).

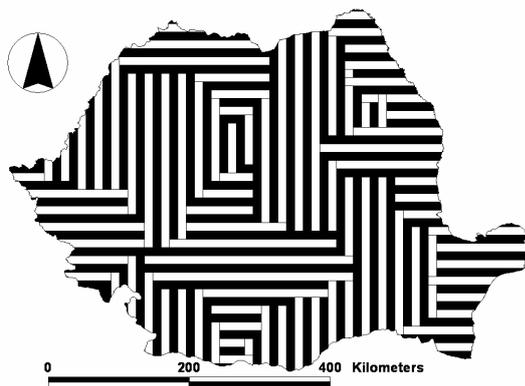
3. The Romanian example

The first particularity of transportation infrastructure is its orientation. In a 2010 study (Petrișor, 2010), orientation was classified binary as "north-south" or "east-west" or on four levels ("north-south", "east-west", "northeast-southwest" and "northwest-southeast"). Geographical Information Systems were used to analyze the orientation of railroads and major road categories. Further statistical analyses were carried out to compare administrative units (counties) and the regions of development. The results of the study indicated major differences among regions, and suggested that interruptions explained by the configuration of the relief may play a decisive role in blocking accessibility. To illustrate this statement, Fig. 1 displays

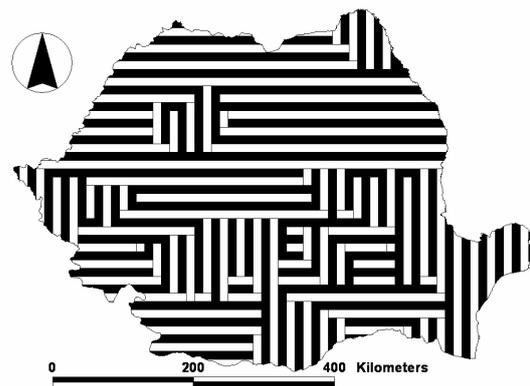
several maps from the study looking at the total length of roads (all types) and railroads within each county, when the orientation is classified binary or using four classes.

In the second case, the analyses were carried out to assess the predominant orientation, but also the deficit (least

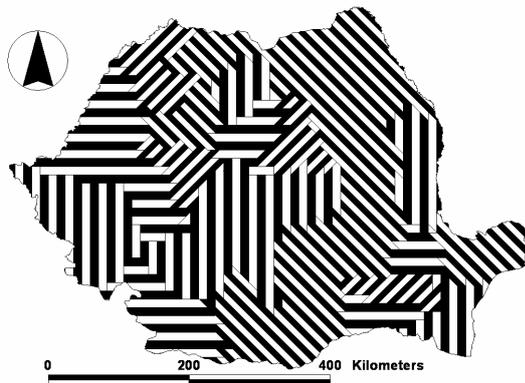
predominant or missing orientation); in case of an equality (more than one orientation missing), the deficit was not computed. If these maps are checked against the spatial distribution of national poles of development, as defined by law, it can be seen that the configuration of routes cuts off the connections between the poles.



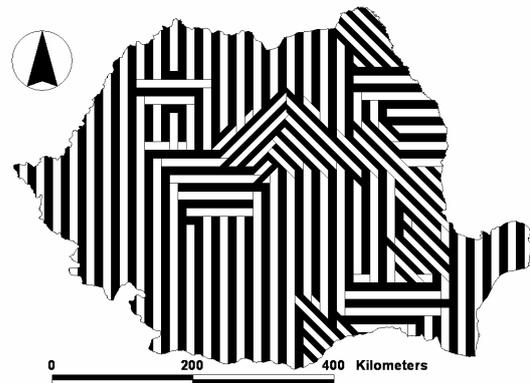
Total length of roads by county



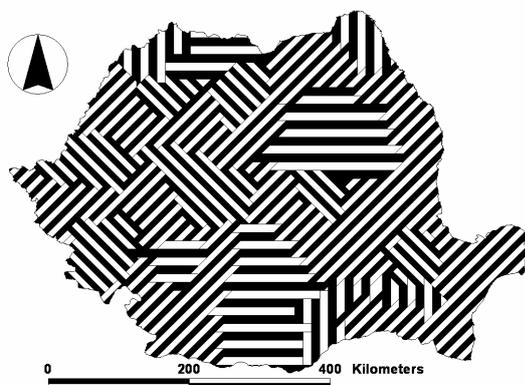
Total length of railroads by county



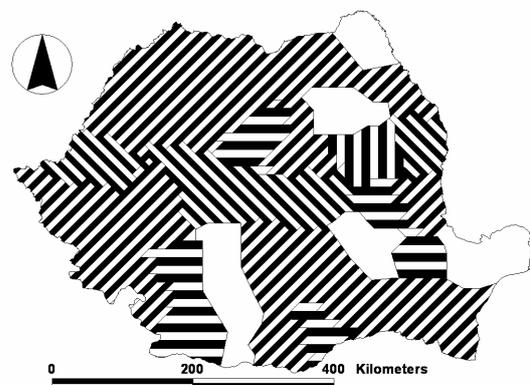
Predominant orientation of roads based on density per county (km/km²)



Predominant orientation of railroads based on density per county (km/km²)



Missing or least predominant orientation of roads based on density per county (km/km²)



Missing or least predominant orientation of railroads based on density per county (km/km²)

Fig. 1. Orientation of Romanian roads and railroads. Hatches correspond to the actual orientation.

The overall take-home message is that, at least for this stage, the development of some regions, the overall connections of Romania with the other European countries, and possible fluxes passing through Romania, as underlined by the strategic documents discussed, are impossible due to the configuration of communication routes. The construction of high speed routes, maintaining the current configuration (impossible to change due to the relief) must be a priority of the government, regardless of political opinions.

A different approach used in a similar study was based on conceiving indicators to characterize the communication routes. Nevertheless, the study was carried out in a different framework: strategic planning. In contemporary society countless power relations cross, characterize and represent the social frame; thus, the individual is not a spectator of power, but its effect; he is a relay that power is passing. Therefore, power is exercised in a network by which individuals not only pass, but they are also core elements of the transit, perceived both ways and in a global context. Power procedures are moving, extending and continuously changing. The aim of the study was to identify the best national security corridor, connected to the European ones. Such corridors should be able to ensure the evacuation of mass population in a short time. European area includes 27 Member States, Malta and Cyprus being the only ones lacking railroads. The European development strategy aims to create a Pan-European transport corridor. European railroads differ in structure, organization, financing and growing travel demands. Their map is relatively homogeneous and their distribution and

quality are good, but throughout history, the railway continuously evolved in the modern lines of today, recording fundamental changes in technology and mentality (Ghițuleasa *et al.*, 2010).

The overall aim is to create a system of related networks, not merely as a domestic network, but included in an international context. An efficient system at the European level originates in the concept of “Euro-Corridor”. Economic incentives taken at national level are very important when related to the investments in areas belonging to the Euro-Corridor. For this purpose, the best solution is extending it toward the areas lacking these opportunities. Proposed routes encompass the existing railroad routes over the territory of each Member State, with changes depending on several parameters. Only five of the ten Pan-European corridors are efficient for optimizing, *i.e.* unconventional corridors 2, 3, 4, 5, and 10. By “unconventional corridors”, the authors meant those not established at any European conference, but drawn on a plan. The new proposed unconventional corridors lead to an open and connected map, which means performance. The unconventional map also recognizes the contribution of other vehicles, offering best travel options (Ghițuleasa *et al.*, 2010).

European networks should also account for the objectives required to establish the Trans-European Network (TEN-T.), providing the most suitable choice of transportation mode for each point of the route. This network can stimulate the economic competitiveness and sustainable development of the European Union, found in the Single Market features, and increase economic and social cohesion. Its development

requires interconnection, interoperability and better access to the national systems of transport (Ghițuleasa *et al.*, 2010).

To achieve the research goals, two indicators were proposed. The first one was build using an analogy with the least square methods to assess whether the path was optimal; the optimal path minimizes the squares of straight distances from accessible settlements. Accessibility was assessed using the European standard 45 minutes isochrone, but translated using an average speed of 65 km/h, yielding a result rounded up to 45 km. All settlements within this distance were selected and their straight distances to the path of the corridor computed (Ghițuleasa *et al.*, 2011).

The second indicator was called “potential accessibility” and consisted of summing up the population of accessible settlements. Accessibility was defined in a similar fashion, but in this case distances were computed between the center of each settlement and the center of the city where the railroad was situated (Ghițuleasa *et al.*, 2010). The rationale of building the indicator was the ability to transfer a large number of people.

Existing corridors and two proposed routes (“Magellan” and “Columbus”) were compared using these indicators. The results of using the first indicator showed that “Magellan” is a better choice than “Columbus” on corridors 2-5 and an opposite situation on corridor 10.

The second method allowed for opting for one of the two on different portions of the corridors (Table 1). The overall conclusion was that the optimal security route is the corridor Bucharest-Arad, as it serves most settlements, the largest total population and has an optimum path.

From a methodological perspective, the studies described underline the potential of geostatistical approaches to substantiate fundamental choices, such as the choice of the national security corridor, and take political decisions related to improving accessibility in order to strengthen socio-economic cohesion and foster balanced and polycentric development at all territorial levels. “Geostatistical methods” mean here all methods situated at the interference of geographical approaches (merely descriptive and connected to the concrete territorial reality) and “statistical methods” (with a high degree of abstractness and loosing the concrete territorial relevance).

4. European lessons

The case studies presented above allow for drawing several theoretical conclusions, placed in a broader European context.

First of all, they suggest the poles of development. In 2007 the research centers were located in Central Europe, industrial and market centers in Central and Eastern Europe, and visitor centers mainly on the ocean and sea sides.

Table 1. Comparison of possible routes of Romanian security corridors.

<i>Indicator</i>	<i>“Columbus” better on:</i>	<i>“Magellan” better on:</i>	<i>Overall choice</i>
Sum of squared distances	C10	C2, C3, C4, C5	Magellan
Potential accessibility	C3, C4, C5	C2, C10	Columbus

Mono-centric development was obvious in Greece, Romania, Bulgaria and other Southern-European countries, where capitals seemed to monopolize development, but the situation changed over time. For example, in Germany all levels of policentricity can be distinguished (Harrison and Growe, 2014). The potentials for innovativeness and research and development activity in Poland are concentrated in the biggest academic centers: Warsaw, Wrocław, Kraków and Tricity, and overall big cities (Poznań and Warsaw) and certain rural areas of central and eastern Poland enjoy the biggest resources of social capital. The main growth poles in South-Eastern Europe are Athens, Sofia and Bucharest, corresponding to the capital cities.

In a general sense, countries situated in Central and Western Europe did not seem to confront these issues. The explanation is linked with the existence of a spatial development policies, which seems to be in earlier stages towards Eastern Europe and well developed in Central and Western Europe.

Second, the methodology allows for forecasting future trends. One of the important considerations to account for is the context of the economic crisis. The poles are likely to be affected, and as the crisis and other important drivers might shift the European economy to different models (green economy, knowledge-based economy etc.), their distribution and hierarchies are likely to shift. Knowledge based economy has already changed its distribution after the rapid progress of countries joining the European Union. The map produced in 2006 showing most Eastern-European countries as either entering the knowledge based economy or boosting entrepreneurial knowledge is outdated.

Several ESPON projects looked at the territorial potential for a greener economy.

Another important consideration is the sustainability of transport. From a circumlocutory viewpoint, this concept can induce large scale alterations in the evolution of communication routes and lead to a new hierarchy of transport modes.

In this context, the Council of Transport Ministers of the European Union defines a sustainable transport system through the following features:

- Allows the basic access and development needs of individuals, companies and societies to be met safely and in a manner consistent with human and ecosystem health, and promises equity within and between successive generations,
- Is affordable, operates fairly and efficiently, offers choice of transport mode, and supports a competitive economy, as well as balanced regional development
- Limits emissions and waste within the planet's ability to absorb them, uses renewable resources at or below their rates of generation, and uses non-renewable resources at or below the rates of development of renewable substitutes while minimizing the impact on land and the generation of noise (Goldman and Gorham, 2006).

Thus, the concept of sustainability extends beyond the efficient operating and emissions issues. Life-cycle assessment further implies production and disposal phases.

This positive definition, enounced in April 2001, is complementary to the definition given by the Organization for

Economic Co-operation and Development (OECD) which bounded sustainability between the limits imposed by health standards and environment protection towards the transport systems (Stead, 2008).

Both approaches can be blamed for failing to provide a comprehensive and pragmatic framework to approach the problem in a manner useful for policy practitioners. The EU approach, for instance, gives no solution on how to mediate or balance among competitive objectives. None of the methods gives an explicit definition of transport system that might be used to achieve these goals (Goldman and Gorham, 2006).

From a structural perspective, the transport system is open and interconnected with other systems. In most cases, in order to be able to use available tools for analysis and design, economists or geographers who study transport issues neglect systemic connections. As a result, neither the changes brought by the transport system in related systems, nor those brought inside transportation as a result of interaction can be controlled.

For instance, air pollution caused more than 100 billion Euros (\$134.95 billion) in health and environmental damage, as a report published by the European Environment Agency found. More than half of the damage is caused by industrial facilities, mainly in Germany, France, Italy and Great Britain. However, a significant pollution level is also recorded in Bulgaria, the Czech Republic, Estonia, Poland and Romania (Schimmelfennig and Sedelmeier, 2004).

While a decade before the industry was practically the main cause of pollution, in the past decade the transport became an

important source of pollution. In Europe almost 30% of the greenhouse effect emissions are caused by transport. In its turn, 70% of the transport contribution is caused by road transport (Proost and Van Dender, 2001). From the geographic perspective, the main intensity of pollution produced by transport is recorded in the area of the poles, with specific weights. In March 2011, for instance, the most intense emissions were recorded in Bucharest.

The decrease of carbon emissions in transport became a primary aim of the European Union by means of "Transport 2050" strategy, produced at the beginning of 2011. The situation might have improved employing sustainable practices which quantify the weights of social, economic and ecologic factors in transport. The main strategies which rely on modifying the structure of transport systems propose route length minimization techniques and the alteration of weights for different transport modes. These strategies imply, on one hand, essential changes in transport policies, both at European and regional level and, on the other hand, both at public level and inside private companies.

Other suitable examples are the consequences of noise pollution or traffic bottlenecks on transport policies and communication routes. The imperative to eliminate negative consequences produced against the transport system results in closing the feed-back loop, which includes the interconnected systems.

The solutions applied also assume strategies like minor route alterations or transport mode changes and even building new routes.

Hence, the evolution of economic, social or environment factors may be vigorous enough to determine the birth of new communication routes. A wide scale example is the case of the TRACECA Corridor which is an alternative to the Eurasiatic Corridor, or to the ancient Great Silk Road.

TRACECA geographic area is increasing and includes now the Ukraine, Moldova and Mongolia, in addition to the countries of southern Caucasus and Central Asia. It is most probable that Romania and Turkey will join soon. While the Eurasian Corridor is limited to southern Caucasus and Central Asia, TRACECA is virtually unbounded.

Therefore, since the geographic position constitutes no restriction in participating to TRACECA and any Eurasian country may join, its operating area may be extended in any direction. USA, Japan and China expressed their interest in this Corridor. The Japanese government has devised a special project for support and investment in the Transport Corridor under its New Eurasian Diplomacy doctrine and, in the US, the adoption of the so-called Silk Road Strategy Act is nearing its end. Both documents imply strong political support and encouragement for building and investing in the New Silk Road. Most probably, these investments will be larger than the ones made until now (Indeo and Kim, 2013).

From a contemporary perspective, the economy of communication routes is perceived as a system intended for exchanging and distributing new forms of cooperation, technology and goods between different regions. The development of microelectronics, biotechnology, nuclear energy and other advanced technologies improved the

quality of production and geographical distances may be easily covered using high speed transport modes.

The emergence of transport corridors is related to other facets of social development, being also actuator and consequence of globalization. This is an important feature of the development context both for European and trans-continental corridors, as the Trans-Siberian and the North-American corridor.

As a consequence of the fact that the issues addressed by sustainability criteria reach maximum frequency and intensity in the area of development poles, the impact of policies for sustainable transport is experienced mainly at this specific level. Great cities include these policies in their transport network development projects. Therefore, the nature of transport system connections is radically changed and so is the transport system hierarchy.

Particularly, the sustainability of urban transport involves four innovation directions:

- Mobility
- City logistics
- Intelligent systems
- Livability

The concept of “mobility” addresses how individuals plan their daily routes. Taking into account the model of micro-social level route planning, the weight of the economical and psychological factors is evaluated.

“Urban logistics” deals with the business of goods movement. Though it is still an immature domain, its early successes suggest that it should be further developed.

The use of “intelligent systems” aims to optimize the relationships between infrastructure and public institutions that operate it. In the framework of this paradigm, we propose reorganizing the management of public infrastructure as a valuable asset in order to be maximized if it is managed effectively.

The cluster of “Livability” methods is based on how the society interacts with transportation systems and they aim to provide support to social needs. Social needs include even opportunities for leisure and social interaction, and accessibility for children and the poor.

A very important consideration is the imperative of integrating transport modes. This aim is supported within the transport policy through the co-modality concept introduced by the European Commission in 2006 to define an approach of the globalization of transport modes and their combinations. For the European commission, co-modality infers the “use of the various transport modes on their own or in combination” in the aim to obtain “an optimal and sustainable utilization of resources”. For this purpose, the European Commission funded a number of projects, such as the eFreight Co-Modal Transport.

The controversial nature of this policy should also be reminded. Many observers consider it an abandonment of a policy oriented towards the development of supporting inter-modality and multi-modality, as proposed in 2001. The latter aimed to develop alternatives to road transport under the framework of a competitive system, while the recent European Union strategy rather aims to obtain an optimum exploiting the domains of

relevance of various transport modes and their combinations.

Amidst the remarkable changes featured by communication routes, it is noteworthy mentioning the emergence of land bridges, e.g., Eurasia Land Bridge II which links Europe and Asia, starts from the Baltic Sea, reaches China through Russia and Kazakhstan and competes with the Trans-Siberian. Some political observers consider that the success of new Eurasian land bridge is the most important contemporary geostrategic issue (Otsuka, 2001).

No lesser significant is the intention to build a third Eurasian land bridge, expressed at the fifth Pan-Pearl River Delta Regional (PPRD) Cooperation and Development Forum, a government sponsored event, by the Yunan provincial government. The route will cross 20 European states from Europe and Asia and link Rotterdam to China through Turkey.

The plurality of factors and changes produced over communication routes and transport policies is obviously difficult to quantify through a systemic model. The state of transport policies may be pictured describing the case of development project for a region featured by an intense economic and social activity. A representative set of elements of transport policy can be found in the development project of Languedoc-Roussillon region. The main ideas are summed up in the following paragraphs.

Functionality of transport and communications system

- Fluidity of cooperative relations
- Mobility of inhabited sectors
- Logistic efficacy
- Touristic accessibility

Achievement of high speed

- High speed intercity trains
- Naval air terminals coordinated with public transport

Intelligent transport

- Intermodal and intelligent logistic
- New generation ports
- Accessibility to economic sites
- Optimized naval routes

Environmental protection and touristic facilities

- Touristic accessibility using high speed trains
- Mediterranean access through ports and airports
- Calls for naval cruises in the region
- Touristic multimodal sites

High level facilities

- Modern railway network
- Reinforced maritime and fluvial facilities
- New logistic potentials
- Sustainable and shared routes

It is obvious that this outline of the transport system project answers many of the challenges brought by contemporary transport policies. It is most interesting to further describe some details of the project.

The geographic position of the region is in the middle of important routes, both oriented north-south and east-west, which link, on one hand, Iberia and Northern Europe, and, on the other hand, Eastern France and Italy. Through its sea-coast, the region opens towards the Mediterranean Sea, in the heart of exchanges between Maghreb and the most dynamic regions of northern Europe (Frankfurt, London and Lyon).

Linking the region to the most important economic, politic and cultural spaces is a primary aim. The poles which influence the region are:

- Paris, politic and economic capital of France
- London, European metropolis
- Brussels, house of most of the institution of the European Union
- Barcelona, fifth European business center
- Madrid and Milan, European metropolises
- Frankfurt, third business center after London and Paris
- Berlin, Amsterdam, Manchester, Dublin

The accessibility of other destinations can be ensured by hub airports. The reason for choosing this route may be summed up as it follows:

- Economically, a good connection with adjacent regions allows for the extent of regional enterprises
- For the universities, the cooperation between poles allows for professors to teach courses in more universities or for student exchanges. The development of exchanges may be beneficial also for researchers and post-graduate students

The means to achieve the livability of the above mentioned connections is mainly increasing the speed of transport. This would bring the following functionalities to the transport system:

- Linking the region with national and international decision poles in a manner which will ensure the presence of the region in politic and economic decision spaces
- Linking regional economies
- Accessing French and European poles which may establish economic flows

- Linking the cities which reinforce regional cohesion

Furthermore, multimodal information and functional exchange poles would ensure the efficiency of the system. The transport corridors would ensure the sustainable economic development employing the following strategies:

- Modal transport will be encouraged and supported for rail, naval and fluvial systems by means of logistic platforms and waterside development
- Infrastructures will be used to minimize the costs of expedition

The regional train network and urban transport would allow for circulating in the region without the need to use a car.

5. Conclusions

The development of some regions, the overall connections among European countries, and possible transit fluxes underlined by the strategic documents discussed, are impossible due to the configuration or lack of communication routes. Increasing the accessibility of regions must be a priority of governments, regardless of political opinions. The case studies presented identify the poles of development and future trends. If initially the research centers were located in Central Europe, industrial and market centers in Central and Eastern Europe, and visitor centers mainly on the ocean and sea sides and mono-centric development was obvious in Greece, Romania, Bulgaria and other Southern-European countries, where capitals seemed to monopolize development, the situation changed over time. It is expected that the transition of economy to post-carbon era or other models – green economy,

knowledge-based economy etc.) – to result into the emergence of new poles and axes of development. Moreover, the concept of ‘transport sustainability’ extends beyond the efficient operating and emissions issues. The main strategies which rely on modifying the structure of transport systems propose route length minimization techniques and the alteration of weights for different transport modes. These strategies imply, on one hand, essential changes in transport policies, both at European and regional level and, on the other hand, both at public level and inside private companies. Furthermore, the evolution of economic, social or environment factors may be vigorous enough to determine the birth of new communication routes.

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