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High-Speed Rail and local economic development A theoretical analysis based on service innovations theory

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**ERSA 50th conference
Jönköping (Sweden), August 19-23, 2010
Sustainable Regional Growth and Development in the Creative Knowledge Economy**

**ERSA-NECTAR Special Session on
High-Speed Rail as a new transport network**

**High-Speed Rail and local economic development:
An analysis based on innovations, local and national spaces and local actors' strategies**

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Work in progress

There are a lot of High-Speed Rail projects in a lot of countries (Belgium, Brazil, China, France, Germany, Portugal, the USA, etc.). In 2009 13,469 km of High-Speed Lines were under construction and 17,579 km are planned all around the world by 2025 (Barron I, 2009). A High-Speed Rail modifies the accessibility of the connected territories. Economic actors of these territories do expect a lot of positive effects in terms of economic dynamism. But the myth according to which transport infrastructures have a positive effect on economic growth has for a long time been challenged by economists. In fact, several researches show that in the field of economic dynamism, no significant effects resulted from infrastructures alone (Bonnafous, Plassard, 1974, Plassard, 1977, Offner, 1993, 1991, Vickerman, 1991). It is the case for a High-Speed Rail infrastructure (Vickerman, 1997, Bazin, Beckerich, Delaplace, 2006b, Blanquart, Delaplace, 2009, Bazin, Beckerich, Blanquart, Vandenbossche, 2010).

As Vickerman wrote “The essential message from this review is that high speed rail developments in Europe have occurred for many reasons, without any clear overall plan, but have instilled almost a mythical belief that they can solve both transport and regional development problems wherever they are built. This belief is not well founded in evidence.” (Vickerman, 1997, p. 36).

But if no systematic effect results from a High-Speed Rail arrival, local economic dynamic linked to this kind of infrastructure can emerge and have emerged in some areas and in some conditions (Bazin, Beckerich, Blanquart, Delaplace, Vandenbossche, 2010, for a review of the different kind of effects and of conditions). **The aim of the paper is to offer an analysis which allows to conceptualize the conditions in which HSR contributes to a local economic development, that is trying** to conceptualize “congruence” as defined by Offner as « the necessary appropriateness between the new supply of transportation, the local preexisting dynamics and the strategies of the actors, such as they appear since the process of

decision of the rail project up until the working out of the supporting suburban operations » (Offner, 1991, p. 60).

We propose to move the point of departure of the analysis and to analyze not only the infrastructure, the High-Speed Line (HSL) or the High-Speed Train (HST), but also the service it provides, the High-Speed Rail Service (HSRS). Using innovation theories, we propose to analyze the arrival of a HSRS in a territory as innovations with regards to a classical railway service. We put forward that these innovations are different according to the countries. Consequently, we have a first level of possible heterogeneity of HSRS and consequently of the HSRS effects on local economic development (Part 1). This analysis allows us to show that it is not the HST or the HSL which induce effects in terms of local economic development but the appropriation of innovations linked to HSRS by local actors. This appropriation depends on external constraints from the point of view of the territory and on the resources available in the territory. Consequently there are two other levels of possible heterogeneity of HSRS effects in space. Finally, we show that this appropriation also depends on the appropriation strategies of the actors located in this territory. These strategies, which can be individual or collective, can give birth to further innovations which are at the heart of local economic development (Part 2).

1. The High-speed rail service, a set of innovations differing according to the countries

In a first part, we present a conceptualization of a classical rail service as a service and we analyze its production process (1.1). In a second part we analyze a HSRS as a set of service innovations and highlight that the production of such innovations can differ according to the countries (1.2).

1.1 Service theories, a useful tool to analyze rail service

Using the analysis of Gallouj and Weinstein (Gallouj, Weinstein, 1997)¹ improved by De Vries (De Vries, 2006), we can represent a rail service in the following way (chart 1).

The rail service is characterized by technical characteristics ($T_1, T_2 \dots T_n$) linked to the product “train” (the kind of engine of the train - diesel or electric, the power of the train, the braking system, railway cars stabilization system or size). There are also some technical characteristics linked to the architecture, to the planning of the train station and to some intangible technical characteristics like production methods of the various booking schemes or the rail service information (methods and procedures to define a schedule that will allow, for instance, different trains to circulate on the network).

But the rail service is also characterized by service characteristics ($Y_1, Y_2 \dots Y_m$), called final characteristics, which are related to the utilities and how there are perceived by the user (speed, safety or comfort, or in the case of an electric engine, low pollution trains) but also to additional services such as food, Wi-fi connection, electrical outlet, etc. and/or in the train station or near it (car parks, car rental, travel agencies, hotels, News stands, cash machines, urban and inter-urban transports, etc.)².

¹ Their analysis improves the analysis of Saviotti and Metcalfe (Saviotti, Metcalfe, 1984) inspired by Lancaster.

² These different kinds of service can be analyzed as Djellal and Gallouj did it with some hospital services: beyond medical services, hospitals offer some leisure activities, recreation, bookshops and so on (Djellal, Gallouj, 2005).

CHART 1 AN ANALYSIS OF THE RAIL SERVICE IN TERMS OF TECHNICAL AND SERVICE CHARACTERISTICS AND COMPETENCES

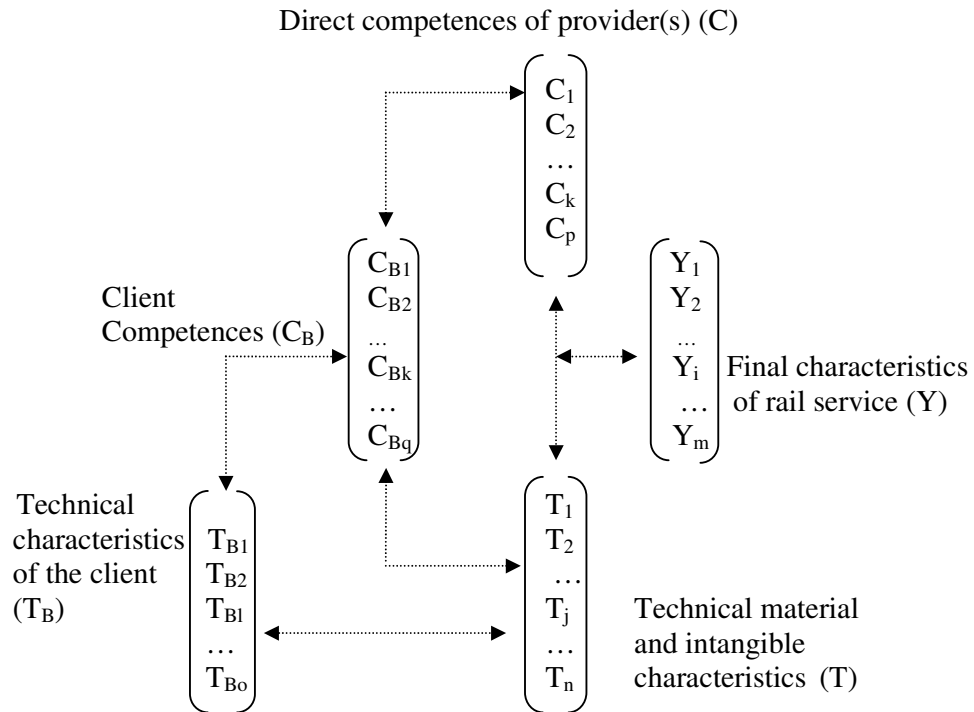


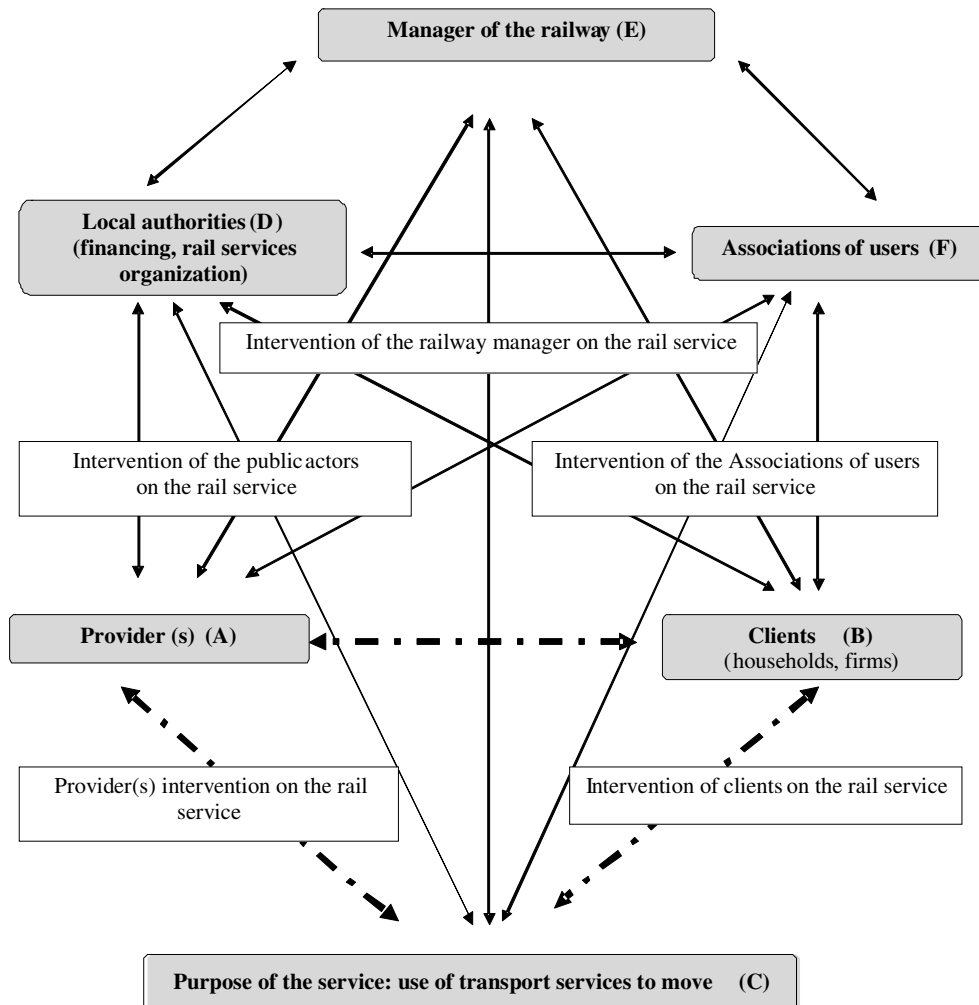
Chart based on De Vries 2006 and Gallouj, Weinstein, 1997

As other services, the rail service is produced in interaction between the provider(s) and the client who both needs some competences that can be represented as vector of competences (C₁, C₂... C_p), for the provider(s) and (C_{B1}, C_{B2}... C_{Bq}), for the client. Finally, and as underlined by De Vries in 2006, it is necessary to complicate the scheme with introducing a vector of technical characteristics for the client (T_{B1}, T_{B2}... T_{Bo}). Indeed, a client can himself use tools allowing him to interact with the technical characteristics of the service provider(s). It is the case for example when a client books his train ticket using the Internet with his personal computer.

To analyze these services, it is important to understand their production process. In their analysis, services theories (Gadrey, 1994, 1996, Djellal, Gallouj, 2002, Gallouj, 2003, Gallouj, 2004, Gallouj, Savona, 2009), highlight the relation between services defined as the "modalities of connection between the providers and the clients about the resolution of the problem for which the client ask to the provider (the object of the service)" (Gadrey, 1994, p. 24). In our case, the agent trying to go to a specific place, asks the railroad operator to identify how this latter can provide him a transport service. Besides their immaterial character, what distinguishes the services is their relational character. "The service is not only a result, but it is also an act, a process that takes place in time and in a relation (of coproduction) between a client and a provider" (Djellal, Gallouj, 2002, p. 138). The analysis of the services then allows to distinguishing three traditional poles: the provider (A), the client (B) and the object of the service (C). The relations between these three poles are represented in dotted line on the chart 2.

But in the case of a rail service, the analysis of the services relation is more complex. Indeed, the service can be handled by various types of agents, one or several railroad carriers, the administrator of the infrastructure and, sometimes, by public authorities; the configuration being variable according to countries. The agents producing the service differ according to countries. Consequently, services relation takes place in time, in a relation between a client and provider(s) which is different in space. As a consequence the service relation takes place both in time and within a relationship but this relationship also differs in space.

CHART 2 THE SERVICE RELATION IN THE CASE OF RAIL SERVICE

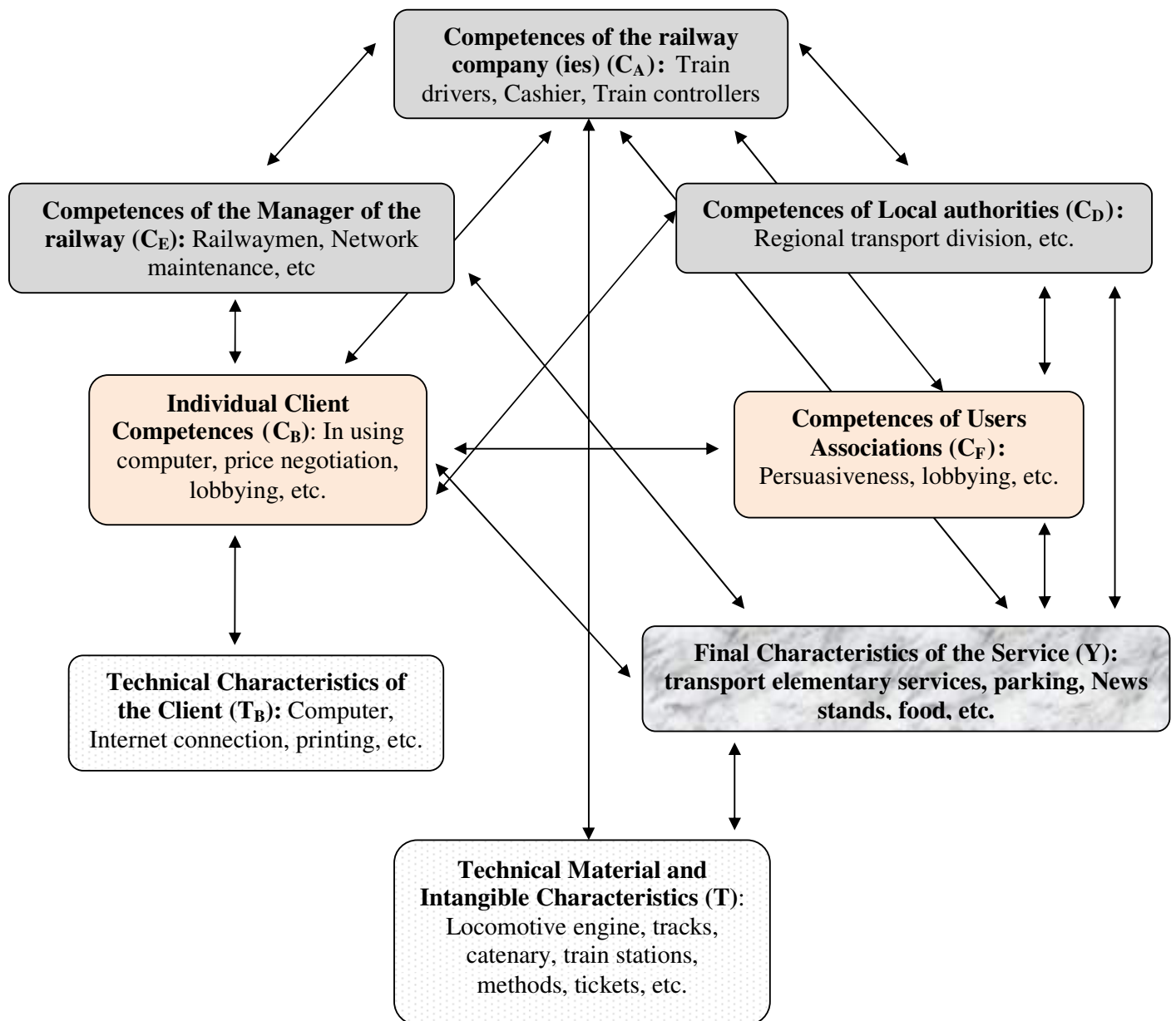


Personal chart based on the works of Gadrey (Gadrey, 1994, p. 40) and Djellal, Gallouj and Gallouj (Djellal, Gallouj, Gallouj, 2004)

Indeed, in France for instance, before transport regionalization has been implemented, the regional authority was the authority which organized the express regional transports. Consequently, it is necessary to analyze the provider not within an individual framework but within a multi-agents framework model (cf. Windrum, Garcia-Goni, 2008, noted by Gallouj and Savona, 2009), including private but also public actors who collectively produce the

service. Consequently, we need to add one or some other providers (C_A , C_D and C_E , on chart 3).

CHART 3 A REPRESENTATION OF RAIL SERVICE, BASED IN TERMS OF SERVICE PRODUCTION



Source : Personal realization

Furthermore, the role of the user is also more difficult to analyze for at least two reasons. First, we have to take into account the diversity of the client. Indeed it can be a firm, a household or an administration. Its competences (C_{B1} , C_{B2} ... C_{BQ}) depend on its ability to use a computer, to print a ticket, to produce its journey, to look for the best price and, for some of them, to negotiate it.

Second, households can also act in an indirect way by means of users associations which impact on the definition and on the later modifications of this rail service. These users associations are intermediate agents between providers and clients. They also have several

competences (C_{F1} , C_{F2} , C_{Fz}). Because of their size, of their audience, they have indeed a more or less important capacity to influencing the definition of the technical characteristics (opening of stop point) or of the services (schedules, number of round trips). These associations are thus at the same time representatives of the customers and, to a certain extent, providers³.

This framework allows us to analyze High-Speed Train and High-Speed Rail Service as a set of innovations with regards to the train and to the classic rail service. This set of innovations depends on technical characteristics but also on the competences of the various providers and kind of clients; these are different according to places.

1.2 The High-Speed Train and High-Speed Rail Service, a set of technical and service innovations which is different according to places

In the Gallouj and Weinstein analysis (Gallouj, Weinstein, 1997 p. 547-557), six models of innovation are distinguished:

- A radical one corresponding to the creation of a new system of characteristics and competences (in our case, T^* , T_B^* , Y^* , C_A^* , C_B^* , C_D^* , C_E^* , C_F^*) or, in a broader definition, to a new system of characteristics and competences (T^* , T_B^* , C_A^* , C_B^* , C_D^* , C_E^* , C_F^*) but with Y remaining unchanged,
- An ameliorative one, which does not question the whole set (T , T_B , Y , C_A , C_B , C_D , C_E , C_F) but only some technical or service characteristics, and/or some competences,
- An incremental innovation, corresponding to the addition of increments, i.e. new characteristics of services increasing the utility of playing agents who use it,
- A recombinative one, which recombines or splits some technical and some final characteristics,
- An *ad hoc* innovation, which is an innovation produced to solve a specific problem for a specific client,
- A formalization innovation, which consists in specifying or shaping service characteristics.

If we use this analysis for a rail service, we can consider that HSRS is an ameliorative innovation, an incremental innovation but also a relational innovation.

1.2.1 HSRS, ameliorative innovations which depend on both national and local characteristics

The HSRS can be seen as an ameliorative innovation of rail services: if the kind and the magnitude of innovation depend of the kind of HST, it does not question the set (T , T_B , Y , C_A , C_B , C_C , C_D , C_E , C_F).

- **It is an ameliorative innovation of technical characteristics**, i.e. an ameliorative innovation of the T vector (for instance motor power, train stability, etc).

This ameliorative innovation depends on national characteristics. If this train circulates at high speed, i.e. a speed higher than 200km/h⁴, it is sometimes on specific tracks, sometimes on existing lines (cf. Campos and al. 2009, Sands, 1993, for an analysis of different kinds of

³ They also have technical characteristics but we do not mention them on the chart not to further complicate the chart.

⁴ Sands, 1993 considers that it is a speed higher than 240 km/h.

High-Speed Line and High-Speed Train). Technical characteristics of HST are different according to countries (Campos and al., 2009, Givoni, 2006, Zembri, 1997)⁵.

First HST, in France for example, seems to be a direct adaptation of classical rail techniques (Klein, 2001, Speck, 2003). In other countries, the technology is different and in some cases, the magnitude of innovation is greater (Maglev, for example, Campos and al., 2009).

Second, the kind of network on which HST circulates can also be different according to countries (Vickerman, 1997). In some cases, the network is centered to a big city, like Paris in France; in other cases, it served many towns in a non hierarchical way.

Third, consequently the location of the train station is also much different according to countries (Givoni, 2006, Ureña and al., 2009): in some cases, there is a new train station built for HSRS; in others, HST arrives in existing train stations. For example, in the Italian case, there is a connection on the classic rail link every 30-35 kms and classic lines were modernized. In Germany, there is no new train station which is not connected to the classic railway network and this last one was improved. Traditional train stations are served even if this rail service induces a waste of time. In Belgium, HST arrives in the town center. In France two kinds of train stations exist: generally in downtown for the connection to Paris and in some cases to Province, and interconnection train stations for the connection to Province.

The fact that different forms and magnitude of rail service innovations, different networks and different kinds of train station locations exist in various countries is an important element because these differences impact on the use of the HSR infrastructure (Campos and al., 2009) and consequently on the potential effects of HSRS (cf. infra).

- **HSRS can also be seen as an ameliorative innovation which improves the final characteristics of services** (Y vector).

First, the commercial speed is improved, reducing journey length. The magnitude of this service innovation will be even stronger as the speed is high. It depends on the technical characteristic of High-Speed Trains and/or on infrastructures (Campos and al., 2009). For example, is the service handled on specific tracks or on classical ones?

Its magnitude also depends on the existence and quality of the classical rail service in the territory (Garmendia and al., 2008). The prior transport network entanglement in the territory also influences the importance of the HST innovation.

If the quality of the classical rail service is very good, this innovation appears to be less important. Then Ureña and al. (2006, noted by Garmendia and al, 2008) “suggest that big cities at one hour HST distance from metropolises may find fewer new opportunities than small cities because they were normally located on important transport corridors and the accessibility amelioration will represent only a marginal improvement”.

This growth of speed can authorize a better frequency. As trains run faster, it is possible to increase their number. This frequency of trains in a week, in a week-end or in a day, is also different from place to place (cf. Bazin, Beckerich, Blanquart, Delaplace and Vandenbosche, 2010 for a review of literature on this subject).

⁵ The fact that different forms and magnitude of innovations exist in different countries has been analyzed for a long time through the analysis of national systems of innovation (Freeman, 1988, 1995, Carlsson, Jacobsson, 1992, Lundvall, 1988, 1992a et b, Metcalfe, 1995, Porter, 1990, 1997, Nelson, 1988, 1993, or Nelson & Rosenberg, 1993, cf. also Delaplace 2009 for a recent critical analysis). The case of High-Speed has been analyzed by Speck, 2003.

The service innovation also depends on the geographical characteristics of the served territories (Campos and al., 2009). In some cases, speed is lower because of an urban or mountainous areas or, because it is necessary to build a bridge and so on. The service also depends on the tariff and on its increase compared to a ticket on a classical line (Willigers and al., 2005).

Second, HSRS can allow the increase of the railroad service capacity (Givoni, 2006, p. 600). Indeed, it sometimes comes and adds on to the existence of other lines; in that case, the so freed classic lines can be dedicated to other means (regional transport of travelers and goods).

Third, in some cases, the change of service characteristics can eliminate transport interchanges and, in some cases, allow access to new destinations by train. Again, this change depends on local cases.

Last, the importance of the innovation also depends on the aimed type of client (different kinds of firms, of households, etc) and on the type of mobility (professional mobility, regular migrations, tourist travelers, etc.). These two points are determined by the characteristics of the territory itself (cf. *infra*).

These kinds of ameliorative innovations need to change the competences vectors of the providers (C_A , C_D , C_E) but also of the clients (C_B , C_F). For example, clients must be able to change their means of transport, to change the way they travel.

We can also analyze HSRS as a set of incremental innovations in service characteristics.

1.2.2 HSRS, incremental innovations in service characteristics

HSRS can also be analyzed in terms of incremental innovation regarding the service characteristics (here railway transportation). The vector Y is modified by the addition of one or several new service characteristics.

It is the case when, first, a new High-Speed Transport Service is offered to the travelers which use it, or when new relations with clients are offered (for example, new subscription system with reservation only by means of the Internet) or when it is possible to travel at high speed and, to connect with Wifi⁶ at the same time. These two elements need new technical characteristics and competences from the client. If the clients have the required technical characteristics and competences then these innovations can increase the number of users and consequently increase the use of the infrastructure.

This kind of incremental innovations needs changes in the competences vectors of the providers (C_A , C_D , C_E) or of the clients (C_B , C_F). Indeed, providers must build competences that allow to produce these services innovation. Likewise, the client competences are central.

Second, the HSRS adds a new characteristic, in term of modernity, to the traditional rail service. Thus, beyond the direct use of services in terms of accessibility, which correspond to services innovation, the modernity associated to the HSRS can be considered as an additional service feature to railway transport, which we describe as semiotic in the sense that it conveys a sign to many actors of either served or not territories. Like a fashion brand has a specific utility which is to distinguish the person who wears it, the HSRS provides a distinctive sign to the territories, a new image (cf. Kamel and Matthewman, 2008, Sands, 1993, Bonnafous

⁶ In France, such an innovation has been available on Thalys and on the TGV Paris-Bordeaux-Pau line in 2003. It is tested at a higher speed on the East-European High-Speed Line.

1980, De Jong, 2009, Bazin, Beckerich, Delaplace, 2009, Vickerman 1997, Willigers and al., 2005, cf. Bazin Beckerich, Blanquart, Delaplace and Vandebosche, 2010 for a review of literature on this subject). As De Jong suggests (De Jong 2009), train is a node and a place. We consider that HSRS tends to increase the importance of the train station as a place (cf. also Mannone, 1997). The capacity of the territory to benefit from this incremental innovation depends on its capacity, *id est* on its competences to appropriate it (cf. infra).

But, in some countries, HSRS can also be analyzed as a relational innovation.

1.2.3 HSRS, a relational innovation

As defined by Dupuis in 2007 and by Berry and Dupuis in 2005, a relational innovation can be defined as the birth of new partnerships between actors to produce a service. It can be considered as a process innovation in the production of the service because it is necessary that new providers coordinate themselves for the service to be produced.

Indeed, in some countries, the production of the HSRS itself can be analyzed as a relational innovation because its production, realization and funding can be jointly carried out by several actors. It is the case in France where the State, the RFF (the French Railway Infrastructure Manager) and the SNCF (The French National Railway Company) have produced the HSRS since the Railway Infrastructure Manager and the Railway Company have been separated. If this separation is now always the case in Europe, it was not the case in the past and it is not necessary the case in extra-European countries (Campos and al., 2009).

Furthermore, the service can also be produced by local authorities. Indeed, for example, the financing of the East European High-Speed Line is the result of an *ex ante* deal between local authorities, the RFF, the SNCF and countries like France or Luxembourg.

Debates were necessary for reaching such an agreement and consensus on the rail route, the location of the train stations and the rail service provided. These debates have modeled the rail service and, in some cases, the existence of a junction with the classical rail service. The coproduction of this HSRS needs that each actor develops some new competences regarding, for instance, the way to produce a rail service.

To a certain extent, this HSRS was also coproduced by users' associations which, as representatives of the taxpayers, considered that they had participated to its financing. The East-European HSL, on which is produced the HSRS, is also the first High-Speed Line in France since the Express Regional Train (ERT) management has been transferred to local authorities.

But if HSRS can give birth to innovations for the territory (access to new services, new functionalities, a new image, cf. *supra*), these innovations alone are not sufficient to induce real effects to emerge. It is necessary that these innovations be appropriated by the actors.

2. The appropriation of the set of innovations linked to HSRS by a territory: the interaction between local and national spaces and strategies

In a first part, we will present what appropriation is and the elements which impact on it (2.1). In the second part, we will show that this appropriation is only possible if actors of the served territories have the willingness to do it. Consequently, it depends on their strategies (2.2).

2.1 Appropriation of HSRS: external constraints and resources of territory

Effects of HSRS depend on its use. But beyond simple use, HSRS can be appropriated. After defining what we mean by appropriation of innovations, we show that this appropriation depends on external constraints weighing on the territories, as well as on the resources and competences which exist in this territory.

2.1.1 Appropriation: what we mean?

In France, various works raised the issue of regional appropriation of new infrastructures (Boursier-Mougenot, Ollivier Trigalo, 1996, for the East-European High-Speed Line Ménérault, 1996, 1997, on North HST; Camillerapp, 1997, for the Bretagne-Pays-de Loire HST; Ménerault, 2000, on the HST in Wallonie and in Britain, etc.).

The appropriation we are talking about here is an appropriation of the innovations linked to HSRS by the users. As developed above, HSRS conveys many service innovations to which actors have access or not, and production to which some of them (local authorities, users associations) may have contributed. Consequently, this appropriation concerns, in some cases, the production of these innovations and in other cases concerns only its use.

This appropriation we are talking about is a concept based on evolutionary theories, on cognitive sciences and on competence-based theories.

Appropriation goes beyond mere adoption or simple use since it is likely to modify the actions of actors. There is appropriation when actors integrate HSRS into their behaviour. Appropriation of a product or of a service implies to control it, to integrate its use in daily life, but it also implies that its use produces “novelty in the life of the user” (cf. Proulx, Rueff and Lecomte 2007, p. 9-10 and Chaney, 2008). To speak of appropriation it is necessary for agents to have an active role in regard to the innovations. This is even truer for service innovations. Indeed, the users of the rail service, by their action on technical characteristics, have in some cases participated to their production. As users interact with providers, this appropriation can have an impact on the competences and behaviours of these providers and on the technical and services characteristics of these service innovations⁷.

Beyond the HSR as a technical object, we underline that it is also a service to which actors have access or not. It is also an object of which they have a representation, in the sense that they have an image of it, that they can or cannot use in a more or less important way and that they can, finally, integrate it to their behaviours. “A new technical object taken at the beginning of its diffusion trajectory can give birth to an intense mobilization of social imaginary” (Desjeux, 2003, p. 8), the HSR thus conveying an imaginary dimension beyond its uses. This imaginary dimension can be positive (growth and prosperity brought by the HSR to the served territories) or negative (the HSR transforming a city into a dormitory town or likely to leading to higher housing prices). Thus « to seize the meaning of a technical device, it is necessary to understand how this device reorganizes differently the tissue of relations, of all kinds, in which we are taken and who us define » (Akrich, 1990, p. 2).

Appropriation also goes beyond absorptive capacity (Cohen, Levinthal, 1990). Absorptive capacity allows a firm to produce innovations but also to increase its capacity to explore and use the knowledge which exists in its environment. It depends on the competences they have.

⁷ In a certain sense, this analysis is near to the Lundvall analysis on interactions between producers and users which are very important in a national system of innovation (Lundvall, 1998a et b, 1992). These analyses seem to be much adequate to services innovations which are co-produced by provider(s) and users.

But if appropriation depends on this absorptive capacity and on individual firms competences, it also depends on will and strategy. Furthermore, if absorptive capacity is an individual one, there is also a possible collective appropriation which necessitates a coordination capacity between various public and private organizations.

This appropriation of HSRS depends on external constraints because these latter impact on HSRS's use.

2.1.2 The appropriation of HSRS: some external constraints

These external constraints lay in the kind of HSRS and HST the actors have access to and in the national or larger scale context in which they are located (cf. *supra*). As Campos and al. underlined (Campos and al., 2009, p. 8), it is a key element because the kind of models of HST allows a more or less intensive usage of HSR infrastructure.

First, the appropriation can vary according to the national context in which the actors are located. For example, the appropriation of HSRS in tourism depends on working time, which differs according to countries. In France, there was a reduction of the working time which allows a fast growth of short-stays urban tourism.

Second, the appropriation also depends on the conjuncture which varies according to time and to national and local spaces. This one indeed influences the dynamics of territories. It also influences mobility and consequently the use of HSRS (Kamel, Matthewman, 2008, Sands, 1993, Bazin, Beckerich Delaplace, 2006a, Mannone, 1995, Klein 1997, Klein, Claisse, 1997). It finally affects the agents' anticipations, but also public policies through its effects on public resources but also on public spendings (Bazin, Beckerich Delaplace, 2006a).

This element is mentioned in a lot of cases of HSRS arrival: in Rheims in France, for example, where the HRS was implemented in 2007, the crisis that emerged in 2008 is partially responsible for the absence of firms in the business park of Bezannes located near the Champagne-Ardenne train station. In Le Mans, still in France, there were some difficulties to market offices programs at the beginning of 1990s. With the deterioration of the economic situation at the beginning of the 90s, the marketing of these offices has almost completely stopped. The second phase of offices in Novaxis, planned for 1995, was postponed in 1997 (Bazin, Beckerich Delaplace, 2006). In Vendôme, the creation of the technological park was made at the time of the economic slowing down observed at the beginning of 1990s and the economic situation did not allow to developing a synergy between the park and the HST (Bellanger, 1991). In the same manner, Klein and Claisse (Klein, Claisse, 1997) evoke the negative effects of the economic situation at the beginning of 1990s on the evolution of rail traffic. More recently Nash writes that "the perspectives of success of the railroad High-Speed depend widely on the future economic growth» (Nash 2009, p. 24). Garmendia and al. 2008 show that from 1993 to 1996, the town of Ciudad Real in Spain, which was just served by HSR, was more affected by the drop in housing construction than the national average. In 1993, about the possible effects of HSR on California, Sands mentioned, "The current recession will reduce all development effects, from the regional to station level" (Sands, 1993, p. 50). Last, business tourism (congresses, conferences, symposia, seminars or workshops, incentives, etc.) is an activity which can profit from the HSRS, but it is a growing sector which is much linked to the economic situation (Bazin, Beckerich, Delaplace, to be published).

Third, as we mentioned above, the location of the train station is different according to countries. Consequently, it is not the same appropriation that can be made of the area around the train station. Indeed as underlined by De Jong (De Jong, 2009), the train station becomes a major center of social activity and a gate to the town. Its location and its urban embeddedness can play a major role in the possibilities of appropriation (cf. *infra*). As Garmendia writes “In France, new activities around peripheral HST train stations have been production areas (De Courson et al., 1993; Mannone, 1995), while in Spain they are housing developments”.

2.1.3 The appropriation of HSRS: constraints linked to the resources of the territory

The innovations appropriation also depends on territory characteristics we call territory resources. Some are generic (homogeneous, independent of the territory) while others are specific (Colleti, Pecqueur, 2005) to the territory (special features linked to the production process itself and to its location. These specific resources availability results from either geographical and natural conditions or from specific historical conditions having shaped the territory or from the kind of actors on this territory.

First, resources depend on geographical conditions. The territory has indeed specific characteristics in spatial terms (its location in relation to other spaces, its internal spatial structure and its physical geography). The location of served territories, near the sea or in the mountains, *id est* places in which destination tourism develops, is a characteristic which may generate an appropriation of HSRS in tourism. The amenities of a town or more generally of a territory depend of these characteristics.

Second, they depend on historical conditions having shaped the territory. It is the case for the existence of an architectural, cultural or gastronomic heritage. It is also the case for the location of the territory with regards to other towns and consequently the time-savings and the distance between the served cities (Givoni, 2006, Kamel and Matthewman, 2008, Sands, 1993) and more generally of the spatial configuration of the territory and of the urban structure of the country. The possible nearness of metropolises influences the possible appropriation of HSRS (Ureña and al., 2009). Last, the size of the city influences its characteristics (Givoni, 2006, Ureña and al., 2009). For example, the size of the city influences real estate prices and quality of life. Consequently, the appropriation of HSRS will be different.

Third, geographical and historical conditions determine the possibilities and the kind of tourism, and consequently the possible appropriation of HSRS by the actors of this sector. In specific cases, urban and business tourisms which are short stay tourisms, are facilitated by the existence of a quality rail service as showed by the analysis of the past experiences of HSRS in France (cf. Bazin, Beckerich and Delaplace, to be published).

Geographical and historical conditions explain the kind and the shape of the town, its degree of concentration and we know that concentrated towns are better to use HSRS (Givoni, 2006). Appropriation of HSRS also depends on the location of the train station and its urban embeddedness (De Jong, 2009, Givoni, 2006). A central location can give birth to a specific appropriation in terms of office development; this is not always the case for new train stations. A central location of the train station in a town, characterized by cultural amenities, can promote urban tourism. Consequently, as Sands mentioned in 1993, the effects of High-Speed Rail Service are different according to the location of the train station (Sands, 1993).

Fourth, resources also depend on the kind of actors on the territory and of their competences. It is the case in terms of sectoral (industrial, commercial, etc.) and technological (processes implemented in different companies) specialization and in terms of types of businesses located there (large companies, institutions, subsidiaries, organizational structure of these companies, etc.). The question of the type of firms (industrial or services, establishment of a big firm or of small firms), of the type of market they serve (local, national, international) and of the competences they have is essential to analyze the possible appropriation of a HSRS (cf. also Mannone, 1995). The sectoral specialization also influences on the population qualification. This last one also has an impact on appropriation because it impacts on actors competencies. For example, if the territory is characterized by a population of executives, there will be a more important use of HSRS because executives use more this kind of transport (Klein et Claisse, 1997, Bertrand, in Chevalier et al., 1997, p. 8, Bazin, Beckerich, Delaplace, 2006).

If the territory is characterized by companies employees of which frequently move, a good HSRS can be very useful, but it is not if there is no or only little mobility of the employees. More generally, the type of inhabitants impacts on the appropriation of HSRS (Garmendia and al. 2008).

Finally, the capacity to cooperate in a territory can also be considered as a resource for the territory (cf. *infra*).

All these resources impact on the economic situation of the territory and on HSRS use (Offner, 1991, Givoni, 2006) and therefore on the possible HSRS appropriation.

Beyond the resources and competences on a territory, the appropriation of HSRS also depends on the willingness to appropriate it. Consequently it is not only a problem of resources and competences but also a problem of strategies.

2.2 Appropriation of HSRS: a central element of the valorization of a HSRS

These appropriation strategies depend on the strategies of the territory's various actors, which are characterized by competences and which occur in a specific macro-economic and meso-economic context. These strategies, which can lead to introducing innovations in products / services, can be individual or collective. In this last case they can lead to relational innovations which, in this specific context (magnitude of the innovations associated with the HSRS of the territory, with the national conditions and with the local specificities) are the key of the HST effects.

2.2.1 Individual strategies of appropriation

This appropriation of HSRS can take various forms and be implemented in various ways and by various actors (firms, households, local authorities...). There is appropriation when these actors integrate it in their strategy, *id est* when they use it as a tool to develop a project of activity. We propose to distinguish appropriation by local public actors (a) and appropriation by local private actors (b).

a) Appropriation by public local actors

The installation of a transport infrastructure such as a new HSR line and its resulting service innovations may question the capacity of territories to use it to generate new dynamics and consequently, in some cases, to be the source of such dynamics. In some newly served areas,

many cases study and diagnoses, whose purpose is to map the future development prospects of the territory, are generally produced. These diagnoses, made *a priori* or *a posteriori* to the arrival of HSR (for example, in France, Bellanger, 1991, for the Atlantic HSR, Mannone, 1995, for the South-East HSR, Bazin, Beckerich and Delaplace, 2006 for the East-European HSR in Champagne-Ardenne), constitute the most immediate appropriation of these innovations. In some cases, these diagnoses have led to the definition and implementation of policies integrating the new service.

The local actors of the territory can also use the image conveyed by the HSRS which constitutes an incremental innovation (cf. *supra*). The image is indeed more and more an attribute of the territory that local actors use in their willingness to differentiate it from other territories. The appropriation of the semiotic characteristics of the HSRS may, for example, be done in terms of communication by the actors who, at different levels, are responsible for the development of the territory. For example in the Rheims urban area in France, many actors have appropriated the TGV individually in their communication policy (cf. Blanquart, Delaplace, 2009, Bazin, Beckerich, Delaplace, to be published). The same thing happened at Le Mans and Lille (in the case of Lille, cf. Menerault, 1997).

Furthermore the train station, which constitutes one of the gates to the city, is an element all around of which the local authority can redefine this city and/or its accesses. The transport framework can be modified to take into account the HSRS in the central train station, even in the case when a new train station is built. In some cases, the construction of a new train station or the arrival of the HSRS in the central train station can also lead the city to rethink the connection with the other transport infrastructures, for example, how highways serve the town.

But beyond individual appropriation by public actors, it can also be the case for private actors.

b) The appropriation by local private actors

It can be the case for firms and households.

In the first case, for example, if there are some consultancy firms on the territory, the HSRS can modify the labor organization of these firms. Indeed it can possibly allow the consultants to travel in half a day in some served cities thus replacing remote relationships with face to face encounters with their clients. In this case, HSRS can thus be considered as a process innovation and as an organizational innovation from the consultancy firms' point of view. Indeed, the productivity of the employees can be increased as far as the HST is also a workplace, a kind of office extension, which is not the case when travelling by car. The Wi-Fi connection, a service innovation (cf. *supra*), obviously participates to considering the time of mobility as a working time, which may increase productivity. But in order to have a real appropriation, the existing company has to modify its production process. For a new company looking for a location, the location choice can depend on a production process which integrates the HSRS.

The HSRS can become a process innovation in a company if this latter implements an organizational innovation and modifies its routines (cf. Nelson and Winter, 1982, Lundvall, 1988). Indeed, the arrival of a HSRS can induce a modification in the way the companies access it and implement their economic activity. It can be the case for companies which realization of activity requires frequent contacts with clients, suppliers or other establishments, or executives frequently travelling to the headquarters in case these are located in another served city.

This new HSRS can thus modify the production process of the services provided by the companies, which activity requires frequent movements towards the capital of the country and other served destinations. But this modification in the production process depends on the capacity and will of the company to reorganize it and to rethink it.

The provider can use the new HSRS to offer new ways of managing customer relationships in the transport service (for example new kind of reservation, new services directly related to transport, cf. *supra*). It can also offer some commercial actions. For instance, at the beginning of the East–European High-Speed Line, the SNCF (French national railway company) sold tickets at a reduced price leading to momentarily develop tourism in these served cities in the East of France.

The capacity and the will of the provider to implement an additional offer during exceptional events on the territory are also important. So at the time of Christmas markets in France, among the recently served destinations, the SNCF sold the Strasbourg destination not the Rheims one (Blanquart, Delaplace, 2009, Bazin, Beckerich, Delaplace, to be published). In the same perspective, in Lille at the time of the big rummage sale, the capacity of some HST between Lille and Paris is increased (Delaplace, 2009).

Consequently, the provider of the HSRS is fundamental in particular in the way he values the rail service of the territory (cf. Menerault, 1997, Chevalier, 1997, Blanquart, Delaplace, 2009, Bazin, Beckerich, Delaplace, to be published). Indeed, as underlined by Speck, about what she calls the “TGV system” in France, the SNCF is "at the heart of decision making, polarizing all the interactions between different actors" (Speck, 2003, p. 35).

Nevertheless the service and its use by the provider may be different according to the territories. This service depends on the nature of mobility and in which direction that the provider wants to develop (regular migrations, business travels, tourism travels, etc.).

The HSRS may also lead to the production of complementary additional services in the real estate domain. Indeed, private and/or public actors of the territory can seize this arrival to propose a new real estate offer susceptible to meet a pre-existent demand, and even to arouse a new demand. It can be the case in the residential real estate market as well as in the office real estate one.

In the field of the residential real estate market, the arrival of a HSRS can induce a fast growth of residential construction. So, an additional offer of housing can be realized for households by local and/or national investors (cf. Bazin, Beckerich and Delaplace, 2010).

In the same way, in office real estate markets promoters and/or private investors can produce an additional offer of offices by constructing office buildings near the train station (Kamel and Matthewman, 2008, De Jong, 2009 Bazin, Beckerich and Delaplace, 2009). It is also the case when new hotels are built. These actions depend on the anticipations of the promoters that HSRS will have effects on the office real estate demand (cf. Bazin, Beckerich and Delaplace, 2009) and on the decisions of local authority about land use (Garmendia and al., 2008).

It can also be the case for example in tourism. Private actors can also produce new complementary services in this field by offering product/services innovations. A travel agency or the provider(s) of the railway services can incorporate the HSRS in its products by selling a package containing a High-Speed Rail ticket and a hotel bedroom. In this case, the actors participating in the tourism activity on the territory are obviously central. But their actions

depend of the kind of activities they want to promote. For example, in the Rheims District, the Champagne Houses, whose activities are strategic for the development of tourism, “have not developed opportunities to visit their cellars since the HSRS has been inaugurated. On the contrary, the difficulties encountered by tourists to visit the Champagne Houses have remained” (Bazin, Beckerich, Delaplace, to be published).

But beyond these different kinds of individual appropriation strategies, appropriation can also be collective. In some cases, this collective appropriation can give birth to relational innovations in the territory.

2.2.2 Collective appropriation and the birth of relational innovations

If this collective action depends on the characteristics of the territory and on the competences of the public and private actors, it also depends on the capacity and will to cooperate of these various actors. This capacity and this will, which can be regarded as elements of the vector of competences that individually characterizes each of them, and can also be seen as a resource from the point of view of the territory. This collective resource will affect the possibility to influence the definition of the service (cf. infra) and the collective appropriation of the HSRS in this territory.

This collective appropriation can arise in a lot of domains and between different kinds of actors (public but also private actors).

The arrival of HSRS can be accompanied by innovations of complementary services directly related to the transport in its physical or commercial components, such as a car rental service in a train station, the reorganization of taxi-cabs, of an urban collective transport or of the Express Regional Train (ERT). In particular, this last reorganization depends on public and private coordination. For example, in France today, the ERT is coproduced by several providers (the SNCF, the Regional authority). Thus interconnection services can be set up so that a lot of inhabitants of the served territory can benefit indirectly from ERT to HSRS. The production of these services requires a coordination of various actors.

In the same way, the access to train stations can be improved from the point of view of the collective service transport. If there is a new train station, it can be served either by a rail service or by an urban collective service. The organization of this urban collective service by road in the city can be revised. Once again, this remodelling requires coordination between local authorities and the collective urban transport service provider. As Sands mentioned in 1993 about HSR in California “The state agency responsible for the development of a high-speed rail network must work closely with local transportation authorities to guarantee that adequate road and transit connections are provided to high-speed rail stations” (Sand, 1993, p. 55). These kinds of collective appropriation seem to be central in the HSRS effects.

In terms of parking, the service is coproduced by the provider of rail service, the local authority and some private providers.

This collective appropriation can also give birth to relational innovations in the territory, i.e. the emergence of new relations between actors of the territory in order to produce new products and/or services innovations.

In France, as mentioned earlier, since rail transport has been reorganized, relational innovations have occurred to produce the rail service. But the new HSRS can, in turn, give

rise to other relational innovations, *id est* the establishment of new relationships between the actors on the territory in order to generate innovations in products / services.

For example, the actors of urban tourism can seize the HSRS to produce various innovations of additional services. The arrival of a HSRS can give rise to the production of tourism packages (train ticket + hotel bedroom, train ticket + stay, train ticket + entertainment, etc.) requiring the coordination of several actors (the provider of the transport service, the provider of tourism services such as travel agencies, restaurants, hotelkeepers, etc.).

These relational innovations in the territory, which correspond to a collective appropriation, seem to be a prerequisite for the enhancement of service and the emergence of new dynamics. Indeed they can thus give birth to defining a territory project (cf. also Menerault, 1997 on the contribution of HST to the construction of a territory project) which will lead the actors to innovating in the relationships with the other actors of the territory and to creating a new organization with a specific goal. These relational innovations can then be regarded as a process innovation to produce a project for a territory and to give birth to coherent and collective policies likely to enhance economic, cultural, human, land, patrimonial or tourist territorial resources.

The more or less formal creation of such an organization is a relational innovation leading to new rules of action, in particular in cooperation between the actors and their definition of common goals. In such a case, the private and public actors, beyond their individual interest, coordinate their actions in order to promote a territory development enabling them to produce their own development.

When private and public actors are involved in a coordinated way in these relational innovations of services, the effects on local development are most important. Indeed, using analysis based on Schumpeter works, we argue that the emergence of several relational innovations associated with products/services innovations, which one could describe as a cluster of innovations⁸ of services, is another element which determines, according to us, the possible positive “effects” of a HSRS arrival. With the kind of HST and HSL, characteristics of the HSRS and of served territories in different countries, the collective appropriation of the innovations, which a HSRS constitutes, and the collective production of complementary service innovations are central elements in the link between HSRS and local economic development. In this way, and as mentioned for a long time by a lot of researchers about technological innovations⁹, these service innovations associated to a HSRS are located in some territories.

Conclusion

The analysis that we led in terms of appropriation of the set of service innovations has a certain heuristics value as regards to the question of the effects of HSRS and this for at least four reasons.

⁸ The concept of innovation clusters has been initially developed by Schumpeter, 1939, to explain long waves dynamics associated with the emergence of new industries. After that, it has been used by many other authors, sometimes in a different way. More recently, it was used by a lot of authors and especially by Porter, 1997, 1999.

⁹ Which use different concepts : innovative milieu (Aydalot, 1985, Maillat, Perrin, 1992, special issue of the “Revue d’Economie Régionale Urbaine”, 1999, N° 3), local system of innovation (Gilly, Grossetti, 1993), or learning regions (Lundvall, 1992) and more recently cluster (Porter, 1997, 1999).

First, it proposes an analysis of HSRS as a set of services innovations that can be differentiated according to countries or to territories which can each be appropriated individually or collectively by the actors of the territories.

Second, it allows to take into account the differentiated capacity of the actors (providers or different kinds of clients or local actors) to appropriate these various kinds of innovation, i.e. to integrate these latter, or not, in their respective behaviour, considering the competences they have.

Third, it highlights that access to a HSRS is not enough. If the HSRS opens up potentialities, their fulfillment depends on a lot of element: the kind of innovation it corresponds to, the actor's competences in the territory and the willingness to use it.

Lastly, in the same framework our aim was to produce an analysis which integrates the different characteristics, at the macro-economic level, at the meso-economic level and at the micro-economic level that can play a role in the HSR effects. Indeed, it seems to us that this multi-level analysis is central to understand why, in some cases, something happens around HSRS while in other cases, there is no effect.

Thus, in terms of economic development in the territory linked to a HSRS, the action of the local authority is obviously not sufficient. It is necessary that the actor, which offers the HSRS, associates itself with the local authority to promote the territory. It is equally important that private economic actors integrate the HSRS in their strategies and also develop cooperation strategies.

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