ATLANTIC-TGV AND MOBILITY TRENDS: THE INFLUENCE OF CRISIS AND OF MODE COMPETITION

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Abstract

The purpose of this paper is to exhibit the main changes in mobility along the Atlantic corridor after the opening to service of the Atlantic-TGV. These changes are revealed by comparing the results from the two waves of a «before and after» survey [Klein, Claisse, 1997].

The paper starts with a brief presentation of the main characteristics of the survey. Then, the results are presented distinctly within three geographical areas differentiated by their average distance to Paris. Within each of them, the three main purposes of travel (business, commuting, and private) are successively considered.

Last, the conclusion relates the findings about Atlantic-TGV to the knowledge already gathered concerning long-distance mobility and high-speed rail services. It basically confirms the existence of a specific "high speed mobility" as well as the definite influence on mobility dynamics of many factors outside the sphere of transport.

INTRODUCTION

A passenger survey has been carried out in the West and the South-west of France in September 1989, right before the start of the new TGV service on the West branch, and then in September 1993, three years after the opening to service of the South-west branch.

The purpose of this paper is to exhibit the main changes in mobility revealed by the comparison of the results of the two waves of survey [Klein, Claisse, 1997]. The results are split according to 3 geographical areas differentiated by their average distance to Paris. Within each of them, the three main purposes of travel (business, commuting, and private) are successively considered. Last, the conclusion relates the findings about Atlantic-TGV to the knowledge already gathered concerning long-distance mobility and high-speed rail services. It basically confirms the existence of a "high speed mobility" as well as the definite influence on mobility dynamics of many factors outside the sphere of transport.

This work belongs to a stream of research highlighting the whole transformations due to the generalisation of high-speed rail travel. The survey is of a before/after type. More than 15,000 questionnaires were thus collected in 1989 and more than 18,000 in 1993. For more details about methodological aspects of this survey, see [Klein, Houée, 1998].

Before reporting on the analyses derived from this set of data, it is advisable to inform the reader about difficulties of a methodological nature encountered during this study. They come first of all from the sample size. The reliability of the results obtained is thus generally very low from a statistical point of view. The statement of a conclusion results consequently more from a convergent beam of presumptions likely to make sense rather than from a rough fact. This weakness represents a severe limitation, not considering that it prevents from too disaggregate analysis.

The second difficulty to be mentioned relates to the general context of the observations carried out and in particular to its variability over time and space. This dimension is extremely sensitive in the present survey as a consequence, on the one hand, of the extension of the geographical area covered, and, on the other hand, of the strong deterioration of economic conditions which occurred between 1989 and 1993. This being granted, neither local specificity, nor short-term economic variations are an exception in the economical and social landscape of contemporary Europe. It remains that a passenger survey is not fully adequate to identify the influence of these occurrences on mobility behaviour. However, if one wishes to better understand the relative influence of the transport supply, progress in this field is absolutely necessary. One can then wonder whether a panel survey such as planned initially (and abandoned because of lack of funding) would not have had a better cost/efficiency ratio from that point of view.

The expected outcomes of the introduction of a high-speed rail infrastructure are in the first place an important rise in traffic and an increase of the rail market share. This applies just as well to the Atlantic-TGV: its consequences on mobility must be first of all considered in terms of evolution of the traffic volumes and of the market shares for the different modes.

A DETERMINING FACTOR : THE DISTANCE TO PARIS

Figure 1 summarises the main changes identified between 1989 and 1993. Outcomes should be considered rather cautiously, as they result from the mere aggregation of data related to distinct periods that cannot be merged through some re-weighting process. However this aggregation helps to a certain extent in emphasising the main results, beyond period- or purpose-specific situations.

This figure states first of all that the traffic trends over the 1989-1993 period are highly contrasted between the three modes of transport considered in the study. Car traffic varies in a limited range and independently from the situation of the two other modes, whereas air and railway traffic are submitted to strong variations with perfectly symmetrical tendencies. In all cases, the distance to Paris appears to be a paramount discriminating factor.

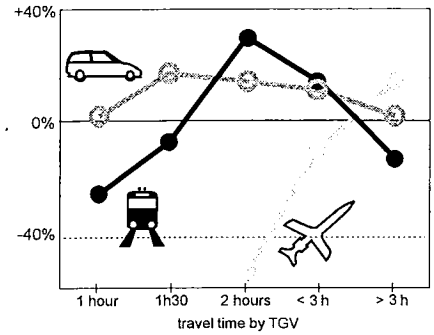

Figure 1 : Evolution of all-round traffic for the survey period according to transport means and to TGV distance-time to Paris

According to the distance to Paris, one distinguishes three successive areas. In the first one, the closest to Paris, air transport cannot compete with the other modes. Unlike road transport, rail faces a decrease of its traffic volumes and market shares. This unfavourable evolution happens within a context, in which the traffic towards the destinations served in one hour by the TGV is decreasing noticeably, whatever the transport mean.

The intermediate zone, corresponding to a TGV travel time between two and three hours, is the most favourable to the TGV. Rail traffic is increasing strongly to the detriment of air traffic. This importance of rail traffic is however vanishing progressively with the distance. The road traffic appears to be, over the 4 years period, hindered by the important deterioration of the economic situation, annual growth not exceeding 2%. But it does not seem to have suffered from any competition on those destinations where the TGV is the most efficient.

The area furthest away from Paris does not seem to be sensitive to the reduction in travel times introduced by the TGV. In this area, the railways have lost a substantial amount of traffic. The use of private cars does not benefit either from the same dynamics as in the closer areas. It looks as if, somewhere around 600 km from Paris, there was a threshold beyond which the duration of motorway trips becomes a serious drawback. This reasoning is of course only valid apart from holidays periods. On the faraway area finally, only air seems able to benefit from the dynamics of mobility. In the following pages, the impact of the Atlantic-TGV on mobility will be differentiated according to the main traffic motivations by fitting to this geographical distinction.

IN 1993, THE TGV LACKS COMPETITIVENESS ON THE SHORTER TRIPS

On the shorter destinations in our sample, we have already mentioned that overall the rail loses market shares as compared to the road. This phenomenon is observed for each of the two main purposes of travel considered: business trips and weekend private trips. It is advisable nevertheless to specify from the beginning that the delimitation of this geographical space where the train seems to lose some of its attractiveness between 1989 and 1993 is not the same for two days-leisure trips as for business trips which are mostly one day-trips.

Concerning weekends, all trips between 200 and 350 km are affected by a major reduction in rail traffic whereas motorway traffic is globally growing. The results are a bit different concerning business trips: reduction in the number of rail trips for the shorter distances, but reinforcement of the rail position around 300 km from Paris. To explain that in all cases, the closest destinations are unfavourable to the train, it must be considered that:

- the context appears to be generally unfavourable to mobility growth for that range of distances;
- secondly, the specificity of railway supply on a short distance tends not to reinforce the competitiveness of rail, in spite of the start up of the Atlantic-TGV.

A not very favourable general context for mobility growth

The comparative results of mobility surveys carried out in 1989 and in 1993 are very sensitive to the economic and social context of the areas involved. Concerning business traffic, certain areas appear to be in crisis while at the same time others, although less numerous, are remarkably dynamic over a 4 years period. The analysis of the data concerning the Sarthe and the Indre-et-Loire departments shows, as well from a quantitative as from a qualitative point of view, that they belong to the zones suffering from a major recession in September 1993. It is the main reason for the decrease of rail business trips in these areas, and more generally of the whole business mobility.

The unfavourable economic situation in 1993 also affects the evolution of weekend traffic. But a phenomenon quite specific to the areas relatively close to Paris appears. It can be interpreted as a saturation of these spaces as Parisian leisure areas. Indeed, the growth rate of the overall Parisian weekend mobility between 1989 and 1993 increases with the distance from Paris (although decreasing again in the remotest areas). Within the general tendency to the removal of leisure locations, there is a decrease in visits to the closest departments (Sarthe and Indre-et-Loire). Conversely there is an increase of weekend trips to destinations in the following ring (300 km), which only benefits to the road.

This phenomenon can partly explain the negative trend in rail traffic. Indeed, in these almost-saturated areas, it is quite likely that private car takes advantage from its greater ability to access any part of the territory, including the less visited regions with residual dynamism, while the rail is restricted by the location of its stations to the already highly-visited areas. Actually, this concept of saturation is to be considered not so much in terms of physical density than as an indicator of possible changes in leisure behaviours, which can be coupled with a deeper change in what people are now looking for.

Whatsoever, the strong economic crisis of 1993 combined with this phenomenon of saturation of the leisure areas nearest from Paris appear to be the main explanatory factors of the unfavourable evolution of rail traffic from one survey to the other.

A deterioration of the commercial supply not balanced by substantial enough time-savings

From 1989 to 1993, railway supply was obviously transformed with the start-up of the Atlantic-TGV. In addition to a substantial reduction in trip duration, an important increase in prices and more complex marketing procedures were introduced. It seems that on the shorter distances, these two aspects of commercial supply deterioration had greater impact than on longer distances. In addition, the shortage of rail trip duration is not substantial enough to get over a significant threshold regarding travel behaviour, or to introduce a gap with road trip duration.

Comparing the rise of fares to the time saved by using the TGV leads to two findings. First, the hour saved is very expensive on short distances: almost 80 FF as an average on a Sunday afternoon, travelling second class, on a Le Mans-Paris or Tours-Paris trip, which is largely beyond the

commonly agreed average values of time for this kind of traffic. Secondly, the price of the hour saved decreases rapidly with distance and appears to be inversely correlated to changes in rail traffic.

Concerning marketing procedures, the obligation for the user to book his seat induces a waste of time which is all the less bearable than the trip is short. But this obligation also introduces a certain rigidity into the use of the TGV: it becomes more difficult, and sometimes expensive, to modify the choice of the train. This aspect is also more sensitive on short trips because proximity often induces less formal relations, calling for more flexibility in the scheduling of travel.

Travel by private car, in spite of the performances of the Atlantic-TGV, is not seriously challenged by the rail. In most circumstances, either road or rail (including conventional rail) has a major advantage. Thus, car use is rather inappropriate for trips having their destination or origin in the centre of Paris. In this case, even businessmen mainly travel by rail. Inversely, trips having their destination or origin in suburbs are most often associated with the use of a car, and family trips usually avoid the rail. On the shorter destinations served by the Atlantic-TGV, modal competition is thus limited to specific segments of trips or customers. Time savings generated by the TGV are therefore not likely to induce a massive shift to rail. This transfer occurs all the less than the performances of the TGV are insufficient to create a real difference in the duration of travel as compared with the road.

As a matter of example, let's compare a Le Mans -La Défense trip by TGV and by car :

by TGV	Trip to Le Mans station and precaution time + Travel time + Trip Montparnasse -La Defense (métro+RER) = 20 + 55 + 30min	**Total = 1h45**
by car	205km	**Total = 2h15**

On the one hand, rail provides, besides a half-hour saving, a higher reliability. On the other hand, road remains more comfortable and more flexible. The advantages of the TGV on the private car thus appear to be quite relative.

Lastly, the reduction in rail travel time generated by the TGV does not induce a new mobility behaviour. Compared to the opportunities already offered in the former situation, therefore compared to what is possible by car, the TGV, between Tours or Le Mans and Paris, it does not mean a radical improvement in transport supply, by reaching an accessibility threshold beyond which a real proximity mobility behaviour, of an urban or peri-urban type, can generalise.

These different arguments, which contribute to explain the decrease in attractiveness observed for the rail between 1989 and 1993 on the shorter destinations served by the Atlantic-TGV, should not be considered independently from each other. It is their conjunction which creates a situation largely unfavourable to the train. It is now advisable to examine briefly, for each of the three main purposes of trip, the qualitative trends which have been noticed on these trips.

Business trip : the fall in rail traffic is general

On the Tours-Paris and Le Mans-Paris trips, the reduction in the number of rail business trips between 1989 and 1993 amounts to approximately 40%. The corresponding road traffic is stable. The rail traffic, as well in relative as in absolute terms has decreased in a considerable way.

In a context where business mobility tends to concentrate on strategic purposes (selling of products for example), the fall in rail use appears undifferentiated, implying the provincial residents as well as those of Paris. Market and non-market activities seem to be concerned in an identical way by this phenomenon. Furthermore, no branch of activity and no profession appears to escape this situation. Lastly, the length of stay does not seem to make any noticeable difference.

In this quite uniform picture of rail traffic decrease, a few exceptions need to be underlined. The main one relates to the considerable increase of half-day rail journeys. In this specific niche, rail travel has gained market shares on the road. The development of this new type of travel behaviour

clearly demonstrates, despite the absence of massive transfer, that time savings allowed by the TGV can impact mobility when a threshold is passed. However, it should be noted that this increase in half-day rail journeys is more than balanced by the decrease of daily rail journeys.

Commuting : less migrants, but on daily return trips

Commuting was at the heart of the debate, at the time when the Atlantic-TGV started up. The commuters, being frequent train users, were the first to protest against the important increase in fares which occurred on this occasion. Moreover, a whole theory was developed around the danger of changing towns like Tours or Le Mans in sleeping suburbs, being at one hour distance from Paris.

In 1993, these towns were indeed closer to the Parisian labour market, but as it turned out, only partially. It has indeed become common practice to commute from these two towns towards Paris. And it is evidenced by the important erosion of the number of weekly return trips and the increase in the number of daily return trips.

Nevertheless, other elements indicate that this generalisation has remained very relative. It should first of all be indicated that the increase in daily migrations which has been observed does not correspond to a simple change in rhythm from people who, before high-speed rail, spent weekdays in Paris and who now go back home every evening. From 1989 to 1993, the number of Le Mans and Tours residents working in Paris has significantly decreased. However we are not able to specify, within this tendency, how much is due to a change in the transport supply and how much results from the 1993 economic crisis.

Between 1989 and 1993, mobility commuting also evolved concerning the social composition On the one hand, executives are, more than other categories, responsible for the transition from a weekly commuting pattern to a daily one. In addition, for people with lower income there is a greater erosion of the commuting traffic towards Paris. This rise in the average social status of the commuters is obviously related to the rise in rail fares. But it is also true that a deterioration of economic conditions and the resulting pressure on the labour market can also lead to some social differentiation (some provincial executives, in periods of crisis, won't hesitate to prospect for a new job on the Parisian market while the provincial residents belonging to lower professional categories cannot access this market because of the rise of unemployment).

Concerning business trips, only the areas closest to Paris show characteristics specific to the shorter destinations served by the Atlantic-TGV. Concerning commuting trips, the major phenomenon, namely the replacement of weekly by daily migrations, also affects, although less strongly, areas located at approximately 300-350 km of Paris.

As a whole, commuting trips make up, on the shorter destinations, the market segment on which the rail best maintains its position. Rail does not only increase its market share on this segment, it also generate new travel rhythms. However this success of the TGV is relative in so far as it concerns a limited traffic volume.

Parisian weekend trips : a strong social differentiation

As for the previous traffic segment, the area of the shorter destinations presents, from the point of view of the competitive position of the rail, homogeneous characteristics up to a distance of approximately 350 km from Paris. On this area, private trips have receded in absolute volume as well as in modal share.

This evolution, however massive, does not concern all the segments of the Parisian weekend trip market in a uniform way. In terms of demographic composition first of all, the single segment of the 20-30 years old is responsible for nearly all the decrease in rail trips and its loss of competitiveness compared to the private car. Secondly, in terms of social composition, the main part of the decrease

in traffic comes from a disaffection from younger employees, workmen or technicians, i.e. low social status categories, whereas the other important categories of population roughly maintain their rail ridership. This is especially true for young students, young people with a high professional status and people between the ages of 30 and 60 whatever their GCV. As far as the week-end journeys of Parisians are concerned, the decrease in rail traffic on the shorter destinations served by the Atlantic-TGV is therefore the result of a trend of global mobility highly contrasted among social categories. Concerning the sole rail mobility, this differentiation is even greater.

The changes observed according to detailed purposes of trip are largely determined by this very strong movement of social differentiation. Thus the decrease in the number of rail trips made by young people is correlated with a strong decrease of the purpose "visits to relatives". Nevertheless, leisure stays, though to a lesser extent, have also suffered from a decline in traffic. The decrease is maximum for journeys made by two people. As this segment has the strongest growth in car use, an important modal transfer can be assumed.

TWO-THREE HOURS BY TGV: THE IMPACT AREA

Observing areas more distant from Paris, arise a number of phenomena which are well-known because already observed on the Paris-Lyon corridor, whereas some others are more specific to the Atlantic-TGV in 1993. It is in any case on this area that the TGV induces the most important changes in traffic flows. Rail traffic has increased and important market shares have been gained, mainly to the detriment of air traffic. In addition to the transfer of customers from air traffic and, to a lesser extent, from road traffic towards the train, a clear creation of traffic in favour of the TGV can also be observed.

The general explanation for this situation is given by comparing performances of the various modes. At these distances, about 400 to 600 km, TGV speed allows for opportunities of travel behaviour that neither the car nor the plane can offer. Compared to air, rail also benefits from an overall favourable difference in prices.

To these explanations in terms of supply, should be added some elements of context which favour mobility. First of all, the effects of a deteriorated economic situation is, on the area analysed here, much less uniform than on the area closest to Paris. It should be said that the surface covered here is broader and thus more diversified. Longer weekend distances, unfavourable to rail in the preceding case, also have here positive effects. Last, together with this impact of an increase in distances, a specific ascending trend of mobility towards the «départements» along the Atlantic coast has been observed.

Despite the crisis, the demand in business travel is met by the TGV

In spite of strong disparities according to the areas, which depend on the distance to Paris and the local severity of the economic crisis, business traffic appears to have reacted rather strongly to the start up of the Atlantic-TGV. From a quantitative point of view, the transfer from air and road, as well as the net creation of traffic, are maximum for destinations reached in 1h30 or 2 hours by TGV. Beyond that, the effect of high speed vanishes.

The first discriminating characteristic of this response of business traffic to the reduction of travel time by rail comes from the more important reaction of Parisians "going out" into the provinces compared to provincials "going in" to Paris. Parisians have a higher growth of business rail traffic, they transfer more massively from plane, and generally speaking they adopt more clearly than provincials the specific behaviour of high speed mobility.

Between 1989 and 1993, there has been a reduction in the length of stays due largely to the train. The development of daily trips, or even half-day trips is, from this point of view, quite remarkable. On this range of distance, the plane completely loses the dominant position it had before. But the increase in business rail traffic on the short time niche cannot be explained only by this movement from the plane towards the train. Connected to this, a phenomenon of traffic induction related to an increase in the number of trips should be mentioned. This combination of factors - shortening of stays and increase in travel frequency - entirely conforms with what was noted, at the time, on the Paris-Lyon connection. It appears nevertheless highly attenuated here by a crisis context which slowed down mobility growth.

The following table shows some 89-93's trends concerning business traffic in the "effects area" served by the Atlantic-TGV. In comparison, the same data concerning the south-east TGV between Paris and Lyon are given. They come from a before/after type survey carried out in 1980 and 1985 on business traffic by plane and train.

Table 1 : some traffic trends in the "effects area"

	1989-1993 Atlantic-TGV	1980-1985 south-east TGV
total traffic	+8%	+56%
train traffic	+39%	+151%
total traffic from Paris region	+20%	+18%
total traffic from provinces	+4%	+86%
0-night trips in total traffic	+15%	+104%
0-night trips in train traffic	+91%	+432%
executives in total traffic	+20%	+23%
non-executives in total traffic	-8%	+189%

Concerning travelling patterns, the increase in the size of the party travelling by rail is also noticeable. There again, the transfer of customers from air seems to be the main reason for it. But this does not mean that the size of the party of the corresponding air trips in 1989 was large : in most cases, trips made alone by plane have been replaced by trips made by TGV together with other colleagues thanks to the decrease in travel budget due to the rail fares.

Executives are the only professional category with an increase in the number of trips. Independent professions, shopkeepers, craftsmen and the self-employed heavily suffered from a worsening in economic conditions. Their business mobility has decreased. There is no "democratisation" of business travel as it was observed on the south-east corridor. It seems that, there again, the crisis thwarted this tendency towards an extension of business mobility to the lower hierarchical levels. In addition to this economic explanation, a more structural one should perhaps be considered concerning a change in company practices, less in favour of this type of extension. More surely, the SNCF' tariff policy is an explanatory factor.

The growth in mobility for executives, however isolated, is quite remarkable. On the area considered here, the rail traffic of administrative and commercial executives has doubled, the one of technical experts tripled. This result is obviously the consequence of an important modal transfer, but also of a clear creation of traffic especially relating to Parisian administrative and commercial executives and to technical experts in the provinces.

Distributed according to the branches of industry of the companies, the growth of business rail traffic appears to concentrate on two segments: industry and the " study-consulting-assistance " sector. These results conform with what was observed on the Rhône-Alpes area. They are articulated, as they were already at that time, around two themes valorising the new trip opportunities provided by the TGV: the conquest of new market areas on the one hand and the internal organisation of firms on the other hand. The opening up to new market opportunities is more related to services than to product exchanges. It is moreover mainly due to Parisians. The increase in the number of trips motivated by the development of internal contacts in firms is mainly

for exchange of information. It concerns Parisians as well as provincials and, for the latter, makes up the bulk of the increase in business mobility.

Table 2 : traffic evolutions for different purposes of trips

		1989-1993 Atlantic-TGV		1980-1985 south-east TGV
in total traffic	to buy products or services	-34%		
	to sell products or services	+23%	+5%	+76%
	internal contacts		+16%	+89%
	other		-4%	+9%
in rail traffic	to buy products or services	-23%		
	to sell products or services	+106%	+41%	+194%
	internal contacts		+57%	+220%
	other		+3%	+66%

All these changes, specific to business rail traffic, demonstrate that on an intermediate zone, corresponding to travel times ranging from one hour and a half to three hours, the travel opportunities offered by the TGV are shown to advantage. More so by Parisians than by provincials, perhaps because of an earlier appropriation of the TGV due to their former experience on the south-east corridor. The relative weakness, compared with the Rhône-Alpes region, of the economic potential of the areas served by the Atlantic-TGV can undoubtedly also help to explain why the Parisians attack the provincial markets much more than the provincials attack the Parisian one. Lastly, the tendency to restrict the use of high-speed rail to executives should here again be underlined.

Commuting : development and socially selective modal split

For distances ranging between 400 and 600 km, the only commuting frequency usually possible is a weekly one. As from 1989, the rail share is high on this market. In 1993, commuters mobility on these routes increased quite substantially, but this growth seems to have benefited to road as much as to rail. The rail market penetration did not increase with the start-up of the Atlantic-TGV. Difficult, under these conditions, to allot the rise in the number of commuting trips towards Ile-de-France region to changes in transport supply.

Parisians' weekends : a social differentiation emphasised for rail traffic

In the intermediate distance area, ranging from 400 to 600 km from Paris, the evolution of the Parisian weekend traffic favours very definitely the rail. In the context of a general traffic growth, the train succeeds in increasing its market shares quite noticeably. The volume of trips has thus increased, sometimes considerably. It should nevertheless be stressed that, in spite of this remarkable performance of the TGV, the private car is never excluded from this tendency in traffic growth. It also has seen its use progress. More than by its ability to divert the road traffic, the TGV is successful on those destinations which are reached in two or three hours, because it succeeds in capturing the dynamism of the market of weekend trips.

This growth in traffic volume also induces important changes in the composition of the railway clientele. One of the remarkable features of this evolution is due to the relative reduction of the number of people travelling alone by train. Between 1989 to 1993, trips associating two or three travellers are those with the most considerable growth. In comparison with a situation, in 1989, in which rail customers usually travelled alone, this tendency indicates the capacity of the TGV to penetrate new market segments.

In terms of clientele composition, the main result comes from the evolution in the socio-demographic structure of travellers. Indeed, the increase in rail traffic in the 2-3 hours zone is largely

due, on the one hand to the highest social categories (executives + independent professions), and on the other hand to the middle age categories (30-60 years). This does not mean that young people or lower social category passengers does not take part in the increase in weekend mobility, but only that the increase is lower (elderly people are almost absent from this type of trip).

This socially differentiated growth is not specific to the TGV. In this area of average distances, road traffic shows the same evolution profile. This suggests in the first place explanations exogenous to transport supply. One can of course mention the consequences of the economic crisis. Another explanatory factor lies in the tendency for Parisians to cover longer distances in weekend, which benefits entirely to the area considered here. It is indeed probable that this basic evolution is first carried out by the categories of population best integrated, economically and socially, in our society.

Nevertheless, this social differentiation is clearly accentuated among railway travellers. One can blame the high tariff policy set up at the starting of the TGV for this result. In addition, it should be stressed that, compared to private car, public transport accentuates by nature the short-term economic trends. One should therefore try to put back into perspective The consequences of the rise up in rail fares on this social differentiation should therefore be relativised.

This socially differentiated growth in rail traffic can be specified according to the purpose of travel. The analysis confirms entirely the general movement of social differentiation. It is indeed for the less constrained and less usual purposes (leisure, visiting friends) that the traffic growth of the higher categories (or of the 30-60 years-old) is the most visible. On the contrary, the socially lower classes have their weekend mobility restricted to more constrained trips (visits to close relatives, family events). Those trends, apparent for all modes, are, again, reinforced as far as rail traffic is concerned.

It is nothing but justified to complete this overview of the effects of the TGV on private mobility for destinations reached into 2 or 3 hours by mentioning, beside Parisian weekend traffic, other types of trips with often looser time constraints. On these market segments, longer stays, trips made by elderly people, the advantages of the TGV are less easily developed. Nevertheless, they generally allow the rail to maintain its position, without however, reinforcing it.

ON THE LONG-HAULS : RAIL TRAFFIC IS MARGINAL

When distances increase even further, the TGV advantages are rapidly reduced until they disappear. Thus, the Toulouse-Paris travel market is a perfect illustration of this phenomenon. In spite of the introduction of the TGV which now connects the two cities in five hours and in spite of a general context of traffic growth, the rail has lost important market shares with a significant decrease of its traffic volume.

The limit between the TGV impact area and the zone where rail travel becomes marginal is not the same neither for all market segments, nor in all directions. First of all, the time constraints of business trips are most strict. In fact, beyond three hours travel time, the competitiveness of the TGV strongly decreases and, as from four hours, rail becomes systematically marginal.

Concerning weekend trips, we have already mentioned that time constraints were looser. It is moreover necessary to take into account the threshold which, beyond 600 km approximately, makes it difficult to reconcile car travel with two days-trips. Under these conditions, it is possible to find particularly favourable situations for rail travel. It results in consequent rises in traffic. It is the case on the south-west Atlantic-coast. The Brittany isthmus on the other hand, although closer to Paris, appears excluded from the TGV impact area.

CONCLUSION

The survey, the main results of which have been commented upon here, is quite specific of the geographical area covered, as well as of the characteristics of the period during which it has been carried out. It is therefore not obvious to decide which part of its results is transferable to other contexts of transport supply transformation. Nevertheless, the diversity of the results obtained, as well as the experience gained regarding observation of mobility changes on the long-haul, make it possible to identify some major trends and a certain recurrence of the phenomena at work here.

1st conclusion : a general tendency towards an increase in mobility

All the surveys confirm a steady tendency towards an increase in mobility on the long-haul. Thus, the comparison of the two French National Transport Household Surveys carried out in 1981/82 and 1993/94, reveals that the number of long-distance journeys (i.e. exceeding a 100 km distance threshold) undertaken between these two dates by all individuals more than 5 years old, increased by approximately two thirds, raising from 3,7 to 5,7 journeys par year [Gouider, 1997]. The results obtained with the introduction of the Atlantic-TGV are in keeping with this general trend .

Focusing our attention on the qualitative changes highlighted by the TGV-A survey, we discover a traffic growth which is spatially differentiated, and which rather clearly reveals an increase in the distances covered. Mobility also appears markedly attracted by the most high-performing modes: air on very long distances, high-speed train in intermediate zones. So many signs of a reinforced space integration of the economic areas served (extension of market areas and employment basins, reorganisation and spatial redistribution of the productive organisations).

2nd conclusion : the high-speed rail zone of relevance

We have already pointed out how much the results obtained are spatially differentiated. The economic and social efficiency of the TGV seems indeed directly related to the performances of this mode of transport according to the destinations.

It can be roughly considered that the market of high-speed rail is restricted to the distances accessible in a maximum TGV travel time of 3 hours (3h30-4h for destinations with a very strong tourism potential). Beyond that threshold, the TGV hardly succeeds in improving the relative position of the rail as compared with the other transport means. Its ability to face air competition remains low and it does not induce any significant modification in mobility practices. This limit is thus both a commercial one, in terms of market shares, and a social one, in terms of behaviour.

We have designated as "impact area" all the destinations with a TGV travel time between 2 and 3 hours. In this respect, the TGV-A survey fully corroborates the observations previously carried out, especially those resulting from a survey of the same kind carried out in 1980 and 1985 and concerning business trips between Paris and Lyon [Plassard, Routhier, 1986, Bonnafous, 1987]. Over this period, the main characteristics of high-speed rail mobility are revealed: strong competitiveness of the train as compared with the plane, shortening of the length of stays compensated by an increase in the number of return trips within a day to the detriment of trips with one or more nights spent away, extension of the practice of return trips within half a day, increase in travel frequency.

Together with these quantitative changes, the nature of mobility is also modified. The specific increase in trips related to the sale of products and most of all of services reveals the phenomena of market area extension. This increase is very apparent in 1993 on the TGV-A corridor as well as in

1985 on the South-east corridor, and particularly relates to the sector of complex services (studies, consulting, assistance...). The other source of the strong traffic growth consists of trips generated by meetings inside a company or a group. This evolution highlights the intense internal reshuffling in productive organisations. It mainly concerns management and administrative positions in reasonably large firms.

The whole of the characteristics and changes which have been just mentioned seems to constitute the core of the so-called high-speed rail mobility. They are observed in all circumstances where rail performance improvement leads to a significant change in travel behaviour. They show, by their permanence as the TGV network develops, a high resistance to the diversity of contexts according to the destination where the transformation of the transport service occurs.

A last important point is related to the intensity of this prototype of high-speed rail traffic. On the destinations reached in 3 hours with the TGV, the changes in travel behaviour already go clearly in the direction which has been just described, but these changes are fragile: they still relate to a limited fringe of flows and can be questioned, as it is the case for Paris-Bordeaux in 1993, because of an unfavourable economic situation or an inadequate fare structure. On the other hand, on the destinations reached in 2 hours by TGV, the changes are greater and longer-lasting. The impression, largely intuitive at the beginning, according to which the Paris-Lyons line represented the ideal configuration for a social and economic development of the TGV performances has been largely confirmed by the later examples. In this respect, the case of Nantes, that the TGV-A now places 2 hours away from Paris and where almost identical and just as massive changes in travel behaviour can be found, is impressive.

The innovation of the Nineties lies, in France, in the start-up of high-speed rail routes on much shorter connections. Not only are TGV travel times significantly reduced (roughly one hour from Paris to Tours, Le Mans or Lille for example) but the configuration of the travel market is also noticeably different in so far as the main competitor is no longer air but private car using motorway. Another difference concerning these short destinations compared to the "impact area" is that return trips within a day are possible, by conventional rail as well as by car, providing time available for business at destination. In this case high-speed rail does not therefore bring a really new service.

The general configuration of the connections reached in 1 hour appears as a whole less favourable to the TGV developing new travel behaviours. Thus the phenomena of modal transfer, very largely determined by travel time and fares when competition occurs between air and rail, are much more complex when car is involved. It is well known that the use of the car is linked to practices and to a psycho-social dependence of a very different nature.

Conversely, certain arguments would plead in favour of high-speed rail giving rise to renewed social uses on the short connections:

- The stronger intensity of exchanges, which generally vanishes with the distance, leads to massive traffic which the railway supply can usually answer satisfactorily.
- Moreover, this massive traffic often generates increasing problems of road congestion that rail can contribute to lessen. It is in particular the case for connections between Paris and the closer cities (Tours, Le Mans and especially Lille).
- The shortening of the TGV travel time to one hour makes moreover possible to undertake very short journeys(half a day, even less). The nature of the "accessibility threshold" that the high-speed rail service then makes it possible to cross certainly needs to be specified. It remains none the less true that, even in a highly deteriorated economic situation as observed in 1993, this kind of practice starts up- although it remains marginal - between Paris and Tours for instance.
- A last potential of important changes is finally to be found in the commuting trips. In spite of the declared will of policy decision-makers and of operators alike, to discourage this type of practice, the observations from the 1993 survey reveal without ambiguity a demand for daily migration rhythm using high-speed rail performances. The reality of this phenomenon has to be stressed, apart from any judgment.

If high-speed and its procession of mobility changes seems to exclude the further destinations (reached in more than 3 hours), it is particularly relevant on connections reached in 2 to 3 hours, the assessment being more complex on the shorter destinations. High-speed can perfectly find its relevance on this type of connection, provided that one does not expect the same functions from it as on the longer connections, and also that be created proper marketing conditions for its competitiveness. In any case, travel time on each destination appears as a key-variable in the analysis of high-speed rail mobility.

3rd conclusion : the weight of elements external to the transport sphere

In the immediately preceding pages, we have presented some of the very general characteristics of the so-called high-speed rail mobility. These permanent characteristics, since they are reproduced in various cases and in particular between Paris and Lyons in 1985 and on the Atlantic-TGV in 1993, does not prevent each destination to have its own important specificity. The presentation of the results of the 1989-93 survey largely insisted on the weight of the economic crisis which started in France as from 1990 and culminated in 1993. The observations carried out then are largely dependent on this deteriorated economic situation. On the Paris-Lyons connection, on the contrary, the very dull economic situation in 1980 had rather improved by 1985 and this has consequences on the results.

Another difference is due to the phenomenon of market area extension which is observed in all cases. In the case of Lyons in 1985, the changes appeared balanced enough in the sense that the movement appeared to benefit companies from the Rhône-Alpes area as much as companies from the Ile-de-France one. This result is linked with the solidity and the diversity of Lyons's economic base. The TGV-A connects Paris with towns offering less favourable characteristics [Damette, 1994]. The deteriorated economic situation also plays a part here. In fact, it is observed in 1993 that the Parisian firms increase their presence on the western and south-western markets without the reverse taking place.

A last difference relates to mobility motivated by internal contacts within companies or groups. In 1985 on the Lyons connection, the development of these traffics was based on a certain "democratisation" insofar as subordinate staff(technicians, employees...) took part in it. The results obtained in 1993 on the TGV-A did not show up the same phenomenon. On the contrary, mobility was tightened around executives' trips. There again, the crisis effect which encouraged the companies to decrease their transport expenditures is of paramount importance. It is nevertheless necessary, to understand this difference, to further examine the contents of the productive reorganisations already mentioned. We present thereafter a very brief summary of it.

A first tendency is to abandon the pyramidal structures to the profit of more cellular structures. When it relates to geographically spread-out organisations, this evolution implies a great fluidity in information flows between the various sites and results in an intensive use of telecommunication and travel means. This tendency is rather characteristic of the branches of industry in which, to competition on production costs, is added a competition on quality, reactivity, innovation capacity [Veltz, 1993]. It generates exchanges on all levels in companies and thus explains partly why a less "hierarchical" mobility develops. The importance of higher services activities in the exchanges between Paris and Lyons confers a significant place to this process.

Another tendency in the transformation of productive organisations relates to the activities where the competition on costs prevails. The space distribution of activities is then only guided by the search for production costs reduction opportunities whereas the structure of the organisations remains quite vertical. Apart from management responsibilities, the needs for communication essentially relate to standardised information which calls for few physical meetings of different parties. The transport demand resulting from these changes is therefore limited and more concentrated on the higher levels

of the hierarchy. In 1993, the crisis probably accentuated this tendency that the characteristics of the economic areas served by the TGV-A already showed.

As can be deducted in connection with the three factors of increasing complexity mentioned above (sensitivity to the general economic situation, potential of market area extension, evolution of relationships within companies), the analysis of the differences between the results obtained in 1985 and in 1993 is very enlightening. It is especially remarkable that this analysis is mainly based on phenomena the origin of which is largely external to the transport system. This is undoubtedly the main result of the experience now accumulated over 15 years about observing high-speed rail mobility in France, to be able to measure the importance attached to these exogenous elements. Before being an element in the evolution of mobility practices, the TGV is initially a product of our society. Its success and its spreading come from the fact that it is a part of the transformation processes applying to our ways of life and of production. To understand how traffic flows change, it is also necessary to understand in which environment they move.

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