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**MEASURING THE IMPACT OF TGV-NORD ON MOBILITY
BEHAVIOUR: RESULTS, METHODOLOGICAL FINDINGS AND
POTENTIAL FOR ANALYSIS OF A THREE-YEARS PANEL**

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Abstract

Since October 1992, one year before the total opening to service of the high-speed rail infrastructure between Paris and Lille, until September 1995, one year after the start of passenger services through the Channel tunnel, the behaviour of the potential customers of the TGV having their residence in IDF or NPC regions, has been continuously observed through a specifically designed panel, the general architecture of which is described in a first step.

Two great types of results will then be displayed: one considering the panel as repeated independent cross-sectional surveys, the other analysing the mobility behaviour on the basis of the constant panel. The corresponding results are commented upon, before debating the related methodological questions to be solved.

Eventually, the on-going analysis is illustrated by the description of a complementary in-depth survey aiming at the understanding of the reasons for the behavioural changes in terms of mobility and modal choice concerning specific target groups.

INTRODUCTION

The study on which this paper is based, has been launched in order to experiment, in the case of TGV Nord which appeared especially suitable to this respect, a new method of measurement of the impact on mobility of major infrastructure projects.

Although before and after cross-sectional passenger surveys had been applied in the past with reasonable success to such investments as TGV Sud-Est and TGV Atlantique, as well as to several new motorways, it was felt that this kind of method was unable to cope with the whole complexity of the changes in travel behaviour. In particular, it was impossible to split the creation of traffic among such categories as totally new travellers and people travelling more often, with possible modifications concerning the duration of the stay, the size of the travelling party or even the detailed purpose of the journey. In addition, it was difficult to evidence the modal shift any time its magnitude was small as compared with the total traffic, which was typically the case for road.

The TGV Nord was offering the opportunity to test the influence on mobility behaviour of a particularly wide range of factors beyond the sole impact of high speed: alteration of the boarder effect for international journeys; introduction of a continuity in the transport chain for the Channel crossing; first step in the building of a HST network through the parisian interlinkage.

It was consequently decided to design a specific tool derived from the methodology of panels, which seemed to be the most appropriate for that purpose. It proved eventually impossible to achieve the initial target of involving residents of all the major zones served by the TGV Nord, including beyond the French boarders. However, it was considered as worth applying the method to the two major areas served in France, namely Ile-de-France (IDF) and Nord-Pas-de-Calais (NPC).

The present paper is first describing the general architecture of the panel, before focusing on the results derived from the two main available sets of data, which relate respectively to the high-speed rail link between IDF and NPC regions and to the opening of the Channel Tunnel fixed link to passenger services, illustrating meanwhile the two major analysis methods used. A section is then devoted to the methodological problems that have been faced, before elaborating about further analysis prospects.

THE GENERAL ARCHITECTURE OF THE PANEL

Constitutive elements of the panel

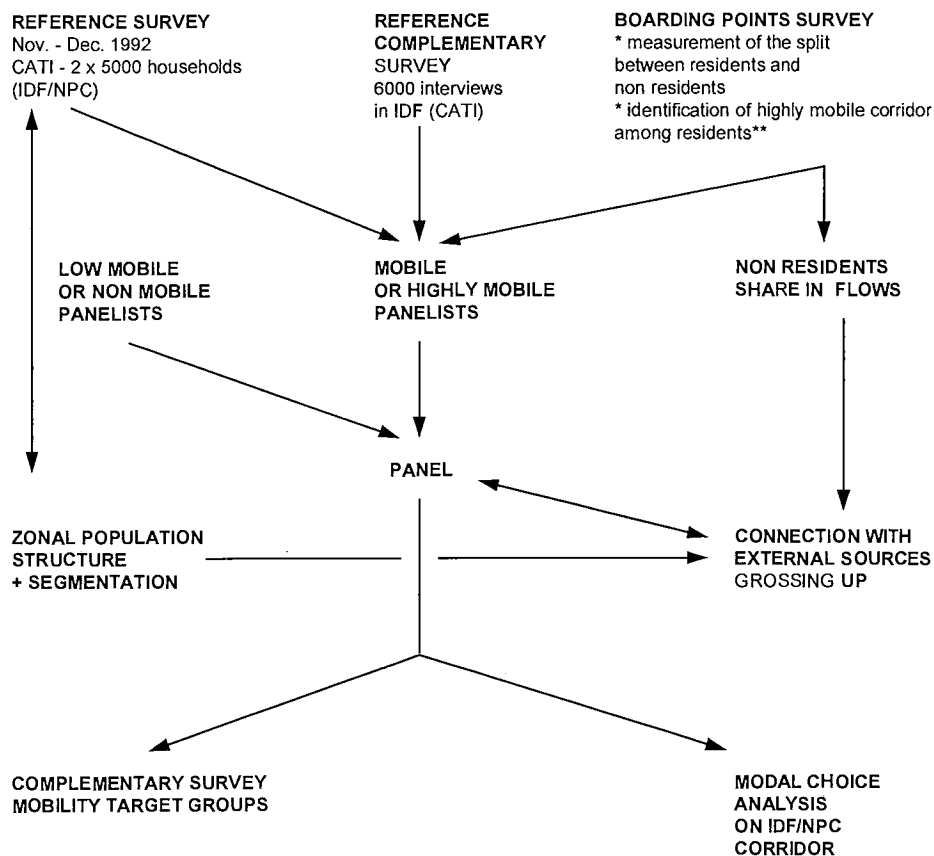
The statistical unit selected is the household. Three initial surveys made it possible to set up the panel considered [see diagram 1]: a reference survey, a reference complementary survey (RCS) and further enquiries at boarding points (stations, airports).

The reference survey

It constitutes the basic support to build-up the panel and aims at :

- giving a general framework of the mobility of households, representative in terms of volume and structure of the market of long-distance journeys on the North-European axis, by destination zone and by population category (the panel being recruited, managed and eventually controlled on the basis of this survey),

Diagram 1 - Architecture of the panel survey



** : [Gare du Nord, Roissy, Victoria Station, Gare du Midi...]

- carrying out a segmentation explanatory of the mobility (and producing categories stable enough) in order to maintain the representativeness over time of the panel sample,
- creating a basis for the recruitment of panelists.

This survey has been implemented in the two French zones where it has been chosen to observe the impact of the North-European High Speed Train upon mobility: IDF region (départements 75, 77, 78, 91, 92, 93 and 95) and NPC region (départements 59 and 62).

The sample size reaches 10 004 households (5002 in IDF and 5002 in NPC), its structure fits with three quotas related with the size of the household and the socio-professional status and age of the head of the household.

The survey is of a CATI (Computed Assisted Telephone Interview) type. Up to five calls are made at different times and days for households uneasy to get in touch with, not to underestimate corridor mobile panelists and so as to avoid biases.

The questionnaire deals with the mobility during the last twelve months for all members of the household travelling towards one of the zones of the corridor apart from their own dwelling zone, as well as with the overall long-distance mobility.

The Reference Complementary Survey

It is used to select corridor mobile households in order to reinforce their proportion inside the panel, through an initial filtering-question about mobility.

It applies to approximately 6000 interviews, only in IDF region, considering the high level of corridor mobility of NPC residents.

The principles for sampling and recalls are the same as for the reference survey.

The survey at boarding points

It aims at:

- identifying households strongly mobile and being public transport users, which are rare in the general population and often out of their home, making difficult to call them, in order to ensure their presence within the panel,
- estimating the non-resident proportion in the corridor traffic for the different zones of emission.

The panel

It applies to households dwelling in IDF and in NPC and whose head is less than 75 years old. Only flows emitted by the residents of these two zones are registered.

The survey period is split in annual waves, the first one from October 1992 to September 1993.

The objective is to carry out analyses on the most numerous possible constant sample, in order to highlight the changes in mobility behaviour. This implies to keep the greatest possible number of initial panelists so as to restrict the need for new recruitments.

The reference survey was not a sufficient basis to find enough mobile people so as to fit with the optimal stratification. The reference complementary survey and the survey at boarding points have been used as the two other sources of recruitment of the mobile panelists.

The size and the origin of the recruitment (i.e. the numbers of panelists recruited from each of the three surveys according to the category of mobility) are determined as a function of:

- calculations of the optimal distribution of the sample, corridor mobile people being oversampled, in order to increase the accuracy for a given sample size,
- the results of the reference survey in terms of mobility on the corridor and total mobility.

Survey frequency and protocol

Two distinct retrospective survey protocols have been implemented according to the mobility level:

- quarterly self-filled mailed-back questionnaires for all panelists with at least two journeys on the corridor during the last twelve months, a telephone survey appearing inadequate for a detailed description of all the journeys and in addition likely to produce a bias as mentioned above;
- semi-annual telephone interviews for the less mobile panelists, mailed-back questionnaires being introduced in case non mobile panelists become mobile.

Moreover, for all the panelists, household characteristics and travelling opportunities are updated annually.

Management over the survey period

The main difficulty is to keep the representativeness of the panel although it is not renewed systematically, taking into account a phenomenon of natural ageing: beyond the problem of people removing outside the survey zone and of non-responses for a particular quarter, arises the question

of attrition which resulted in maintaining the motivation of the panelists through the attribution of gifts phased with their answer (subscriptions to periodics).

This factor is particularly important because likely to introduce a non-systematic bias into the sample, the drop out rate being more important for low mobile and highly mobile panelists.

Demography of the panel

One finds hereafter the evolution of the number of panelists per initial category of corridor mobility. The final survival rates of the IDF and NPC postal panel samples are respectively 66% and 71%. When the population is too heterogeneous, no percentage is mentioned.

Table 1- Demography of the panel by initial category of corridor mobility and zone of residence

IDF							
<i>Initial category of corridor mobility</i>	wave 1 4 Qt 92	wave 5 4 Qt 93	wave 9 4 Qt 94	wave 10 1 Qt 95	wave 11 2 Qt 95	wave 12 3 Qt 95	<i>Survival rate*</i>
11 journeys et +	312	241	203	195	188	177	57%
6 à 10 journeys	266	216	194	185	186	179	67%
3 à 5 journeys	480	399	366	356	354	339	71%
2 journeys and - (initial postal)	256	212	194	190	187	178	70%
2 journeys and - (tel. changed in postal)	42	82	117	120	124	116	
Total postal	1356	1150	1074	1046	1039	989	73%
Total telephone (2 journeys et -)	1667	1187	870	870	786	786	47%
Total panel (except new recruited)	3023	2337	1944	1916	1825	1775	59%
New recruited (2nd year)		288	227	220	214	197	
TOTAL PANEL	3023	2625	2171	2136	2039	1972	65%

NPC							
<i>Initial category of corridor mobility</i>	wave 1 4 Qt 92	wave 5 4 Qt 93	wave 9 4 Qt 94	wave 10 1 Qt 95	wave 11 2 Qt 95	wave 12 3 Qt 95	<i>Survival rate*</i>
11 journeys et +	561	467	409	382	369	355	63%
6 à 10 journeys	330	283	259	250	243	243	74%
3 à 5 journeys	380	336	319	307	302	298	78%
2 journeys et - (initial postal)	191	156	149	142	142	137	72%
2 journeys et - (tel. changed in postal)	57	114	169	176	151	170	
Total postal	1519	1356	1305	1257	1207	1203	79%
Total telephone (2 journeys and -)	737	507	365	365	318	318	43%
TOTAL PANEL	2256	1863	1670	1622	1525	1521	67%

*: ratio (wave 30/09/95) / (wave 31/12/92)

A COMPARATIVE ANALYSIS OF WAVES CONSIDERED AS INDEPENDENT SAMPLES : TRENDS IN IDF/NPC FLOWS OVER THREE YEARS

A comparison before and after the introduction of the TGV (based upon the two first annual waves) on IDF/NPC corridor reveals a sharp contrast in behavioural trends between the two residential areas :

- an almost total lack of reaction from IDF inhabitants illustrated by stability in the rates of mobile households, in the average number of journeys per household and per mobile household, as well as in the modal split.
- a clearly noticeable impact of the improvement in supply for NPC inhabitants, albeit restricted to a more intensive mobility of already mobile households, the size of the population of mobile households remaining globally about constant.

The increase in rail traffic during the year TGV was brought into service is mainly due to the generation of new trips and not to a modal shift.

On the other hand, the growth of mobility on the same corridor between the second and third years of the panel is due essentially to IDF residents, restoring the initial balance of flows slightly in favour of IDF residents (which means, considering that IDF region is far more densely populated, a household mobility rate much higher for NPC residents -40% instead of 17% for IDF residents-)

Table 2 - Breakdown and trend of IDF/NPC traffic¹ according to the residential area

Residential area	Breakdown of households	Breakdown of IDF/NPC flows			Traffic trend		
		Year 1	Year 2	Year 3	Year 2/1	Year 3/2	Year 3/1
IDF	75.5%	51.5%	49.5%	51%	+ 1.5%	+ 8.5%	+ 9.5%
NPC	24.5%	48.5%	50.5%	49%	+ 8.5%	+ 3.3%	+ 12%
Total	100%	100%	100%	100%	+ 5%	+ 6%	+ 11%
Number of trips		(26 204 ¹)	(27 461 ¹)	(29 069 ¹)			

¹: in number of trips made by individual members of the household

Table 3 - IDF/NPC household mobility according to the residential area

Residential area	Mobility indicators	Year 1	Year 2	Year 3
IDF	Mobile households rate ¹ on IDF/NPC	17 %	16.5 %	17 %
	Average number of trips ² per household	1.8	1.8	1.95
	Average number of trips ² per mobile household on IDF/NPC	10.7	10.9	11.5
NPC	Mobile households rate ¹ on IDF/NPC	39.5 %	40 %	40.5 %
	Average number of trips ² per household	5.2	5.6	5.8
	Average number of trips ² per mobile household on IDF/NPC	13.1	14.1	14.3
Total	Mobile households rate ¹ on IDF/NPC	22.5 %	22.5 %	23 %
	Average number of trips ² per household	2.6	2.7	2.9
	Average number of trips ² per mobile household on IDF/NPC	11.7	12.3	12.7

¹: proportion of households where at least one member has made a trip on the corridor during the year

²: total trips made by individual members of the households surveyed

In terms of reasons for travel, the trend is mainly indicated by the rise in the number of commuting trips, especially for NPC residents. An overall increase by half in the flows is registered for this purpose over the three-year period, whereas the volume of trips for private purposes is stable during the same period.

Table 4 - Structure and trend of IDF/NPC traffic¹ per purpose

Residential area	Purpose	Year 1	Year 2	Year 3	Trafic trend		
					Year 2/1	Year 3/2	Year 3/1
IDF	Business	20%	19.5%	20%	-2%	+11%	+8%
	Commuting	11.5%	14%	14.5%	+24%	+13%	+40%
	Private	68.5%	65%	65.5%	-4%	+8.5%	+4.5%
	Total	100%	100%	100%	+1.5%	+8.5%	+11%
Number of trips		(13 491 ¹)	(13 661 ¹)	(14 814 ¹)			
Residential area	Purpose	Year 1	Year 2	Year 3	Trafic trend		
					Year 2/1	Year 3/2	Year 3/1
NPC	Business	20%	20.5%	18%	+10%	-8%	+1%
	Commuting	30.5%	36.5%	41.5%	+31%	+17%	+53%
	Private	49.5%	43%	40.5%	-6%	-2%	-8.5%
	Total	100%	100%	100%	+8.5%	+3.5%	+12%
Number of trips		(12 713 ¹)	(13 800 ¹)	(14 255 ¹)			
Residential area	Purpose	Year 1	Year 2	Year 3	Trafic trend		
					Year 2/1	Year 3/2	Year 3/1
Total	Business	20%	20%	19%	+4%	+1%	+5%
	Commuting	20.5%	25%	27.5%	+29%	+15.5%	+49.5%
	Private	59%	54%	53%	-5%	+4.5%	-0.5%
	Total	100%	100%	100%	+5%	+6%	+11%
Number of trips		(26 704 ¹)	(27 461 ¹)	(29 069 ¹)			

¹: in number of trips made by individual members of the household

In terms of the mode of transport used, the impact is markedly different in the two residential areas:

- in NPC, a steep increase of almost ten points in the rail market share from the first year of TGV service, this share remaining at this level during the third year.
- in IDF, paradoxically, a slight decrease in the train modal share during the year the TGV service was introduced, although the original level was twelve points lower than the one for NPC, the market share again remaining stable during the third year.

Table 5 - Structure and trend of IDF/NPC traffic¹ per mode of transport

Residential area	Mode of transport	Year 1	Year 2	Year 3	Trafic trend		
					Year 2/1	Year 3/2	Year 3/1
IDF	Rail	27.5%	26%	26%	-3%	+7%	+4%
	Road	72.5%	73.5%	74%	+3%	+9%	+12%
	Total	100%	100%	100%	+1.5%	+8.5%	+10%
Number of trips		(13 491 ¹)	(13 661 ¹)	(14 814 ¹)			
Residential area	Mode of transport	Year 1	Year 2	Year 3	Trafic trend		
					Year 2/1	Year 3/2	Year 3/1
NPC	Rail	39.5%	49%	49%	+34%	+3.0%	+38%
	Road	60%	51%	51%	-8%	+4.0%	-5%
	Total	100%	100%	100%	+8.5%	+3.5%	+12%
Number of trips		(12 713 ¹)	(13 800 ¹)	(14 255 ¹)			
Residential area	Mode of transport	Year 1	Year 2	Year 3	Trafic trend		
					Year 2/1	Year 3/2	Year 3/1
Total	Rail	33.5%	37.5%	37%	+18.5%	+4.5%	+27%
	Road	66.5%	62%	63%	-2%	+7%	+4.5%
	Total	100%	100%	100%	+5%	+6%	+11%
Number of trips		(26 204 ¹)	(27 461 ¹)	(29 069 ¹)			

¹: in number of trips made by individual members of the household

CONSTANT PANEL ANALYSIS : THE IMPACT OF THE CHANNEL TUNNEL

The comparative analysis of the trends of IDF/London flows on years 2 and 3 of the panel considered as independent samples, shows a very large increase in traffic, especially for private purpose, with a specific growth of the «Tunnel» modes, i.e. Eurostar and Le Shuttle, which could be expected, but with also a significant resistance of the traditional ones: moderate decrease of air traffic, significant increase of ferries traffic.

Constant panel analysis shows that in 1994/1995 (third year of the panel), about two thirds of mobile households were not mobile the year before, whichever their area of residence.

However, this figure is not only the consequence of the important increase on the corridor of IDF residents being mobile, but also of some volatility of the mobility. As evidence of this, 51% of IDF residents mobile on the corridor during year 2 were not mobile on year 3, despite the introduction of tunnel services in the meantime.

This very important turnover in households mobile on this corridor from one year to the next exceeds what has been observed on IDF/NPC corridor, where the rate of turnover is about 40% for IDF inhabitants, and slightly more than 30% for NPC inhabitants.

Such a result is probably quite consistent with the rate of mobility on the corridor for a given year: the lower this rate, the higher the probability, everything else being equal, to get a high turnover rate. Being mobile during two consecutive years is dependent indeed on the opportunities of

mobility on the corridor, and consequently, on the initial intensity of mobility: the larger the number of trips during year 2, the higher the probability to be mobile on year 3 (and reciprocally).

As an example, 70% of IDF residents with at least 3 journeys towards London during year 3 were mobile on the corridor during year 2, and nearly 50% among them already made 2 journeys during year 2.

Table 6 - Identity and turnover of mobile on IDF/London and NPC/London between year 2 and year 3

Mobility year 3	Mobility of inhabitants of IDF, year 2, for 100 households of the category of mobility year 3			Mobility of inhabitants of NPC, year 2, for 100 households of the category of mobility year 3		
	Non mobile	1 journey	2 journeys and +	Non mobile	1 journey	2 journeys and +
Non mobile	95 %	4 %	1 %	92 %	6 %	2 %
Mobile						
1 journey	73 %	21 %	6 %	74 %	18 %	8 %
2 journeys	57 %	32 %	11 %	NS	NS	NS
3 journeys and +	29 %	25 %	46 %	NS	NS	NS
total	65 %	24 %	11 %	66 %	23 %	11 %

Mobility year 2	Mobility of inhabitants of IDF, year 3, for 100 households of the category of mobility year 2			Mobility of inhabitants of IDF, year 3, for 100 households of the category of mobility year 2		
	Non mobile	1 journey	2 journeys and +	Non mobile	1 journey	2 journeys and +
Non mobile	92 %	6 %	2 %	91 %	7 %	2 %
Mobile						
1 journey	56 %	29 %	15 %	67 %	20 %	13 %
2 journeys	50 %	20 %	30 %	NS	NS	NS
3 journeys and +	28 %	19 %	53 %	NS	NS	NS
total	51 %	26 %	23 %	64 %	21 %	15 %

For each of these tables, percentages are to be read by row, for instance, out of 100 households dwelling in IDF, mobile in year 3: 65 were non mobile in year 2, 24 had made one journey on the corridor, 11 had made two or more journeys on the corridor.

Concerning modal transitions, mobility during both year 2 and 3 is more developed among air than road travellers, because of the more regular character of purposes of trips for the first category.

Among households mobile on the corridor during the two years, air travellers in year 2 keep using air transport in a greater proportion: half of them remain air exclusive users, a quarter become air non-exclusive users, and the last quarter shift to another mode, mainly high-speed rail. Among road travellers in year 2, on the other hand, modal choice in year 3 is more balanced between rail and road.

Among exclusive users in year 3 of one of the new modes, either Eurostar or Le Shuttle, nearly three quarters are new mobile, to be compared with 60% of exclusive users of air transport. The rate of new mobile is obviously less important within the users of several transport modes, just because they travel more often, so that the probability they travel during the year is higher. Last, within road travellers, the highest proportion of new mobiles is to be found among users of Le Shuttle.

Among travellers in year 3 previously mobile, air travellers were to a large extent travelling by air in year 2, whereas the previous travel behaviour of Eurostar or Le Shuttle users is more diverse.

Table 7 - Evolution in year 3 of mobile for each mode in year 2

Mobile of year 2 for the mode ...	Mobility per mode of year 3				
	Air exclusive	Rail exclusive	Road exclusive	Multimode	Non mobile
Air exclusive	27 %	11 %	3 %	14 %	45 %
Road exclusive	4 %	16 %	13 %	2 %	65 %
All mobile	19 %	13 %	7 %	10 %	51 %

Table 8 - Origin of mobile for each mode in year 3

Mobile of year 3 for the mode ...	Mobility per mode of year 2			
	Air exclusive	Road exclusive	Other mobile	Non mobile
Air exclusive	37 %	2 %	2 %	59 %
Rail exclusive	15 %	9 %	4 %	72 %
Road exclusive	8 %	12 %	3 %	77 %
Multimode including air	66 %	4 %		30 %
Multimode including rail	48 %	13 %		39 %
Multimode including road	26 %	16 %		58 %
All kind of mobile	25 %	7 %	3 %	65 %

Percentages are to be read in row, for instance out of 100 monomodal households in year 3, 37 were monomode air during year 2 and 59 were non mobile. The three multimodal modalities are not mutually exclusive: thus, a road and air mobile in year 3 will appear within air and road multimode, and trimodal are registered in the three categories of multimode.

As far as the purpose of trip is concerned, the rate of turnover is surprisingly identical for both business and private journeys, around 60% in both cases, probably offsetting two opposing effects: the lower proportion of mobile for professional reasons and the greater stability of their mobility on the corridor.

The other significant outcome is that for both purposes, the turnover is all the lower as the previous mobility intensity was higher: only about 40% for panelists with two professional journeys or more on the corridor the year before, but inversely about 80% for panelists with only one journey, either for professional or private purpose.

Table 9 - Professional mobility on Paris-London corridor for year 2 et 3

Professional mobility in year 3	Professional mobility in year 2		
	Non mobile	1 journey	2 journeys and +
Non mobile	98 %	2 %	0 %
Mobile			
1 journey	79 %	18 %	3 %
2 journeys and +	41 %	28 %	31 %
Total	59 %	21 %	20 %

Table 10 - Private mobility on Paris-London corridor for year 2 et 3

Private mobility in year 3	Private mobility in year 2		
	Non mobile	1 journey	2 journeys and +
Non mobile	96 %	4 %	0 %
Mobile			
1 journey	82 %	14 %	4 %
2 journeys and +	53 %	22 %	25 %
Total	64 %	15 %	21 %

Another interesting result related to trip purpose is the correlation between private and business mobility on the corridor. Indeed, whereas the average rate of mobile households is 4% for professional purposes and 8% for private purposes, 10% of mobile for private purposes are also mobile for professional reasons, and 21% of mobile for professional purposes are also mobile for private reasons.

This correlation becomes even more obvious when enlarging the reference period to two successive years, considering as mobile any panelist having travelled at least once during those two years: mobility rates for professional and private purposes amount then respectively to 6% and 11,5%, whereas conditional mobility rates (i.e. the ratio between the number of mobile for professional and private reasons during the two years and the number of mobile for private -respectively professional-reasons) amount to three times more, respectively 18% and 34%.

THE METHODOLOGICAL PROBLEMS

The problems encountered are commensurate with the multiple innovations introduced :

- implementation of a reference survey to provide a general frame and a sampling basis for the panel,
- adoption of an optimal stratification, resulting in the need to find ways of oversampling mobile panelists,
- prejudice against replacing defaulting panelists, given the non transferability of mobility behaviour along a specific corridor between individuals belonging to the same grouping defined by merely socio-demographic criteria,
- adaptation of surveying methods to the travelling frequency of panelists (using telephone and mail, at different intervals),
- use of a segmentation as a grossing up basis,

- definition of two analysis methods, a traditional one based on statistical comparison of the samples of each annual wave of the panel, and a specific one referring to panelists constant over the period.

The problems generated by these innovations have in some cases led to rather complex treatments. The grossing up procedure is a good illustration for that. The reasons for imbalance are diverse:

- different sampling rates in each of the two residential areas, and spatial stratification of the sample, in the reference survey,
- oversampling of classes with the highest corridor mobility, in order to produce an optimal stratification,
- merging of heterogeneous sources of recruitment, households and travellers,
- different attrition probabilities according to the residential area, to the mobility class, and to the way of collecting data (which may vary over time according to the mobility intensity of the panelist).

A key point of the chosen grossing up procedure is the segmentation according to non dependent variables as explanatory as possible of present or future mobility, stable over time and allowing a reliable measurement. The objective is to maximise at each step the intergroup variance up to the point where the desired number of groups, size of classes and/or total variance is reached. The more explanatory variables are the existence of business telephone contacts as well as the presence of friends and relatives in other zones of the survey area (together with, for NPC panelists, the presence within the household of someone having a high professional status).

On this basis, grossing up has been processed according to the following steps :

step 1 Grossing up of the general sample coming from the reference survey, by adjusting simultaneously on the margins diverse criteria surveyed across the whole population: segment as described above of course, but also mobility group (including transitions from non mobile to mobile), geographical strata and household size.

step 2 Grossing up of the sample coming from boarding points, adding to the division by the frequency of trip, a factor adjusting, according to the type of recruitment (in a railway station, an airport, towards a specific destination), distribution of trips on effective distribution of trips of the whole of highly mobile (dwelling in IDF and Nord Pas de Calais regions) in the survey at boarding points.

Indeed, the maximal frequency considered in the survey at boarding points as well as in the reference survey for the mobility within the corridor, was «20 journeys and over», but it has been checked thereafter that some panelists were largely exceeding this threshold. Thus, a traveller with hundred journeys would be considered just the same as one with 25 journeys, although the first has a four times higher probability of being selected. More realistic weighting coefficients have consequently been estimated by refining the «20 journeys and over» segment on the basis of the number of journeys on the corridor during the first year of the panel.

However, some drawbacks remain: limited length of the recruiting period giving no guarantee that the annual declared frequency be representative of the probability of selection; possible change of behaviour between the first year of the panel on which is based the refining of the «20 journeys and over» segment and the recruiting year; implicit and unverifiable hypothesis that recruitment of the «20 journeys and over» fits with the effective distribution according to the number of journeys.

step 3 Inclusion in the general sample, adding a corrective factor adjusting the modal distribution on the distribution for the main sample, to take into account the unequal treatment of rail and air on one side, and road on the other.

step 4 Calculation for each mobility class of the relative weight of panelists coming from the general sample and from boarding points, the chosen apportionment for the highest mobility class being 45% from boarding points and 55% from ordinary procedure.

Eventually, the socio-demographic distribution of households is controlled, according to such variables as age, socio-professional status of the head of the household and size of the household. A gentle adjustment proved necessary to give equal representation to each quarter of the year.

Besides, for the second and third annual waves of the panel, a specific attrition of categories with a mobility level very different from the average has been considered, using the crossing of corridor mobility for year 1 and 2, as well as statistics available elsewhere.

ON-GOING ANALYSIS

The specificity of the panel, namely the follow-up of the behaviour of the households over several successive periods, allows for multiple analyses. Two of them have already been developed:

- first is an in-depth analysis of the mobility behaviour on IDF/NPC corridor,
- second attempts to build a disaggregate model of modal split on IDF/NPC corridor.

The first one is presented thereafter.

In-depth survey of mobility behaviour for target groups

On the basis of the constant panel over the three years, certain panelists (184), belonging to target groups in terms of types of mobility and modal split level and evolution, have been interviewed again about the reasons for changing their behaviour on the IDF/NPC and IDF-NPC/London corridors.

The survey proceeded in several phases:

- sending, before the telephone interview, of the document «evolution profile» to each selected panelist, restoring its quarterly mobility over the three years in terms of mode of transport, purpose of trip and size of the party, as described in the panel, through a graph to which was attached a sheet also at the disposal of the interviewer describing the household and individual characteristics.
- free comment by the interviewee of its profile of evolution,
- questions from the interviewer about travel opportunities, constraints, opinions with respect to the car and the train, and eventually the influence of the TGV on its past behaviour, the conditions according to which he could modify its future behaviour, and its perception of TGV.

Nine targets groups were selected for this purpose, among panelists originated from both zones of residence.

The eight first refer to the mobility on the IDF/NPC corridor, the ninth to the mobility towards the Greater London:

Target group 1: Mobility and rail share increasing *

Target group 2: rail creation of traffic,

Target group 3: road exclusive travellers with mobility increasing or constant *

Target group 4: Mobility increasing and rail share constant or decreasing *

Target group 5: Mobility constant or decreasing and rail share constant or increasing *

Target group 6: Mobility constant or decreasing and rail share decreasing *

* between at least two consecutive years

Target group 7: Hypermobile (selection among individuals with more than hundred journeys over the three years),

Target group 8: Non mobile individual over the three years, belonging to a non motorised household and having contact opportunities with the other zone of the corridor,

Target group 9: Mobile during years 1 and 2 on IDF/London or NPC/London corridors, and individuals becoming mobile on these corridors in year 3 by using Eurostar or Le Shuttle services.

The interview was dealing with the following items on the basis of the reference documents sent in advance:

- purpose of trips (private/business/commuting) and evolution over time,
- reasons for (non) utilisation of an alternative mode of transport: objective constraints/individual preferences,
- reasons for the increase/stability/decrease of the number of trips and of the modal choice for a given purpose,
- psychological impact of the TGV Nord: remembrance of the date of opening to service, changes in travel behaviour, durability of these changes, reasons for them,
- personal travel opportunities towards the considered zone (presence of friends or relatives, of professional locations, previous zone of residence...),
- Chinese portraits of the TGV Nord and of the car (what would it be if an animal...).

The on-going analysis includes a detailed codification of interviews as well as a confrontation with data available in the panel.

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