



**HAL**  
open science

## Understanding rail mobility: are there some links between modal shift to rail services and image of the train?

Sophie Hasiak, Fabrice Hasiak

### ► To cite this version:

Sophie Hasiak, Fabrice Hasiak. Understanding rail mobility: are there some links between modal shift to rail services and image of the train?. World Congress on Railway Research, May 2016, Milan, Italy. halshs-01715933

**HAL Id: halshs-01715933**

**<https://shs.hal.science/halshs-01715933>**

Submitted on 23 Feb 2018

**HAL** is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.



## **Understanding rail mobility: are there some links between modal shift to rail services and image of the train?**

Sophie Hasiak<sup>1</sup>, Fabrice Hasiak<sup>1</sup>.

<sup>1</sup> CEREMA Territorial division for the Northern and Picardie Region, Lille, France

\*Contact: sophie.hasiak@cerema.fr

### **Abstract**

Considering challenges of daily sustainable mobility, French authorities aim to promote modal shift from private vehicle to train. But everyone agrees to say that the only railway services improvements are not sufficient to attract new users. There are other factors involved, such as the image of the train. Our research suggests an evaluation of the influence of the train image on modal shift assessed from a traditional method. It questions the train perception by car drivers who may take the train.

### **1. Introduction**

How to promote rail services use, how to promote modal shift from private vehicle to train? These issues are part of concerns of French authorities in charge of rail services (the State and Regions) in a context of implementing sustainable mobility policies.

Comparing the attendance trend of trains with rail services improvement shows that the only service investments on technical performance of the train (frequency, rolling stock, ticket prices) are not sufficient to attract new users. However, rail supply policies are based on findings of numerous works (for example Crozet 2005, Vleugels et al. 2005) which emphasize that the decision-making factors of modal choice essentially concern travel time and cost criteria. But researchers (Brisbois 2010, Bourg 2011, Flamm 2004) highlight the existence of sociological factors such as the image of modes that may affect the modal choice.

Our research focuses on evaluating the potential modal shift from car to train by considering modal choice parameters relating to both technical performance features and image of the train. It also analyses the train perception of car users and measures their willingness for a modal change.

### **2. Literature review**

Evaluation of transport modes image has been studied in several works but the latter primarily focus on comparative analyzes between private car and public transport in general (Rocci 2007, Kaufmann et al. 2010, Potomac 2000, Cain et al. 2009). There are few studies dealing with perception analysis of each public transport mode (Cain et al. 2009, Megel 2001). However, the main results highlight that there is a preference for rail technology (light rail, tramway, train), so that we may talk about a "psychological rail factor" (Scherer et al. 2012). And individuals use a combination of objective and subjective attributes to characterize the train: thus, convenience is combined with transport mode utility, performance and feelings aspects (Hasiak et al, 2016). Having a positive or negative perception of the train depends on several factors, including lived experience of the train and profile of individuals (Hasiak et al., 2016).

Management experiences of modal shift such as Voluntary Travel behavior change initiatives (Brög et al. 2009) are applied all around the world. Based on individualized travel marketing methods, they focus on

drivers who are in a situation of modal choice and are willing to change their travel mode. As these methods are implemented with voluntary drivers, there may be a bias in the full knowledge of barriers of taking the train. Evaluations of modal change initiatives including the use of environmental-friendly modes conclude to a decrease of driver car trips from 5 to 15% (Brög et al. 2009).

### **3. Methodology**

Our work is based on a data analysis of a regional household travel survey implemented in the Picardie region in Northern France in 2014 (14,350 persons over 10 were interviewed). This territory is located between two important regions: Nord Pas de Calais region, a densely populated cross-border region, and Paris region. The modal shift approach concerns regional travels. By regional travel, we mean a trip of more than 10 kilometers from home with the particularity that at least one end of the trip is located outside the urban public transport area.

Our work is based on cross-checking the evaluation of car travels number who could be made by train, with the image of the train. Assessing modal shift from car to train requires to calculate the possibility for each car trip to be made by train using Musliw software (Palmier 2010). This first step identifies the car trips for which a train alternative exists, whatever the service quality. Then, the second step selects the most “realistic” train alternatives according to supply criteria highlighted in scientific literature:

- Criterion 1: trips chaining, especially those that are most often made by train: they mainly concern travels from home to work or study place and then come back home;
- Criterion 2: travel time ratio comparing train (including access and egress times, waiting time) and car: this ratio is estimated between 1.1 and 2.6 depending on travel length and degree of time travel competition;
- Criterion 3: number of transfer connections: we consider that a travel is made at the most with 2 or 4 trains according to the type of origin-destination;
- Criterion 4: walking egress time and total walking time for train travel: these ratios respectively correspond to a maximum of 15 and 30 minutes;
- Criterion 5: driving access distance to the station: the maximum is 15km.

The previous values were estimated from train users’ practices identified in the Picardie survey. If the first two criteria seem to be essential for assessing a modal shift, taking all the criteria into account allow us to quantify a realistic potential of modal shift from car to train.

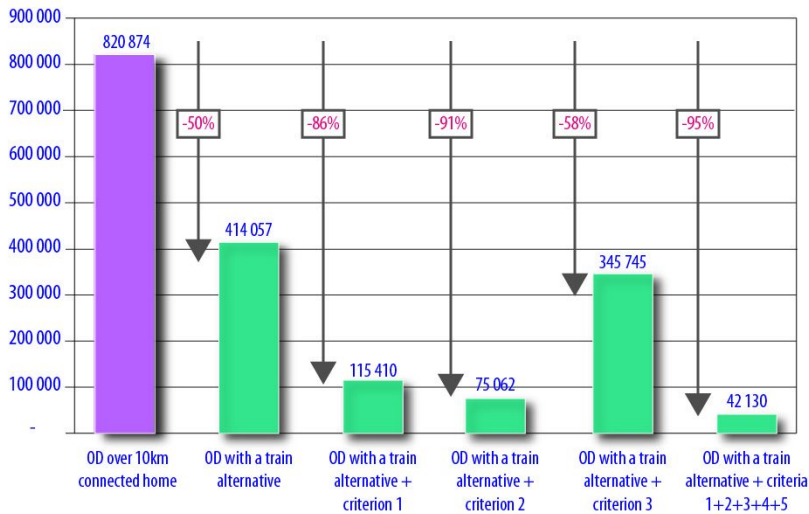
## **4. Results**

### **4.1. Evaluation of modal shift based on features of travel performance**

In this section, the evaluation of modal shift from car to train is led on the basis of conventional modal choice criteria relating on travel performances: travel patterns and travel time.

According to regional survey data, each day, there is about 1 million regional car trips, 75% of them are connected to home. Among these trips, our simulation model appraises a potential of 414 000 car travels for which there is a train alternative, that is to say the origin-destination is covered by a rail service, whatever its quality. Different scenarios based on the combination of our modal choice criteria were defined in order to select the OD trips covered by a train service which may be considered acceptable for individuals. They lead to a modal shift estimated within a wider range from 42,130 to 115,400 trips. This would correspond to a reduction in car trips between 10 and 30% (Fig 1).

fig. 1. Number of daily car trips according scenarios of modal shift

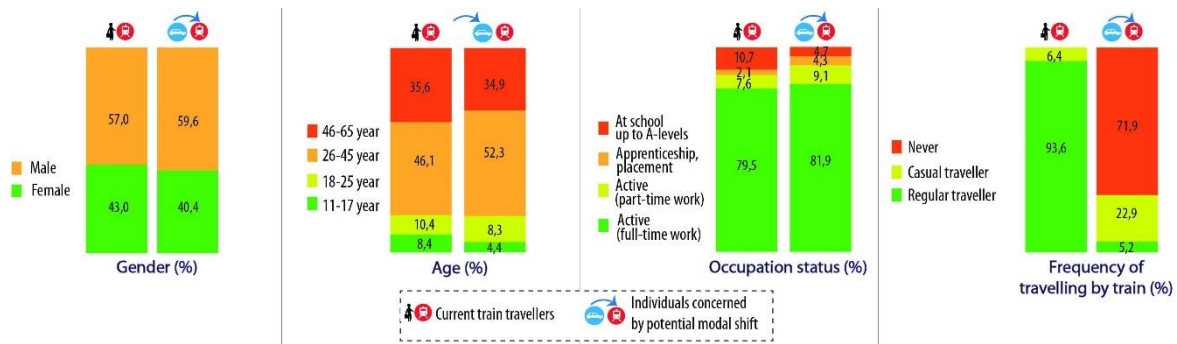


The maximum potential assessed on the only basis of travel patterns (criterion 1) appears very optimistic, even idealistic since it does not consider travel time, which is a major criterion of modal choice. On the contrary, the shift estimated from the combination of all our five criteria, even if it is minimalist because of lots of constraints, seems to more reflect a "realistic" situation of modal choice.

In the following paper, we will consider this latter evaluation of modal shift. Despite its minimalist value, it still represents a meaningful volume. Even if the decrease of car trips corresponds to only 38500 vehicles (that would not significantly contribute to reduce road congestion), it is an important rate if we consider the current attendance of regional rail services. Indeed, there are about 94,700 daily train travels. The shift of 42,000 trips from road to rail would lead to a 44% increase of rail traffic. This percentage corresponds to 22,000 additional users in trains. It mainly concerns internal trips in the region (58%) but 40% of the shift also affect trains running to Paris region. As a consequence, it raises issues about the ability of the current rail services to absorb this additional traffic, since some rail routes may be at saturation limit, especially those running to Paris region. An analysis of trains congestion (current occupancy rates) should be led by the competent authorities (region and rail services operator).

We therefore characterized the potential shift of 42,130 road trips according to the competitiveness of train services expressed in time, since travel time is a major criterion of modal choice. It shows that 7% of them correspond to trips for which the train appears to be very competitive as train travel time is quite equivalent to road one plus or minus 10%. But 61% concern car travels for which individuals should accept a greater train travel time, around 1.1 to 1.6 longer according to the trip distance.

fig. 2. Profile of individuals concerned by a potential modal shift



Finally, the profile of individuals concerned by this potential modal shift is very similar to the current train users one (Fig 2). However, there is an important exception: it concerns their past lived experience of the train. Thus, almost 75% of them say they never use the train.

#### 4.2. Influence of train perception on modal shift evaluation

This section deals with the potential influence of train perception on modal shift evaluation conducted previously. We classified the degree of perception into three groups: the image of the train is said positive if both adjectives given by individuals refer to positive aspects, otherwise it is either negative (two negative adjectives) or mixed (one positive and one negative adjective). In our previous modal shift volume, 27% of people have a positive image of the train, which can be a favorable factor to a modal change. Among the 63% remaining, 42% of drivers talk about the train negatively, which calls to say they could be a refractory population to take the train. However, would they not be completely willing to a modal change? To evaluate their willingness, we measured their degree of modal change by analyzing the qualifiers nature of the train given by individuals.

Whatever the image of the train, they mainly use three attributes to qualify the train image (fig 3). They unanimously evoke performance and convenience of the train. But the third attribute differs from the train opinion. The individuals with a negative opinion will talk about utility of the train whereas the others will refer to the feelings aspect.

fig.3 : train attributes given by individuals concerned by a potential modal shift



According to the train opinion, these attributes are differently expressed. Individuals having a positive image use the same words as current rail users: they emphasize speed, convenience and “relaxing” comfort of the trip. This way of thinking allows us to consider them in our modal shift evaluation. Car drivers having a negative train perception give some performance qualifiers such as unreliability and slowness, which seem not to be contradictory to consider them for the shift calculation. Indeed, reliability is a challenge for authorities and operators to improve services quality. Moreover, talking about the train as a slow transportation mode seems more to refer to a lack of knowledge of rail supply than a reality. On the contrary, the terms of constraint and unsuitable services invite us to take a different position. Considering various lifestyles, family organizations and working cycle, we can assume that, whatever the actions we could implement, these people are likely to have limited potential for change. In our sample, this type of qualifiers represents 49% of trips made by individuals having a negative image of the train.

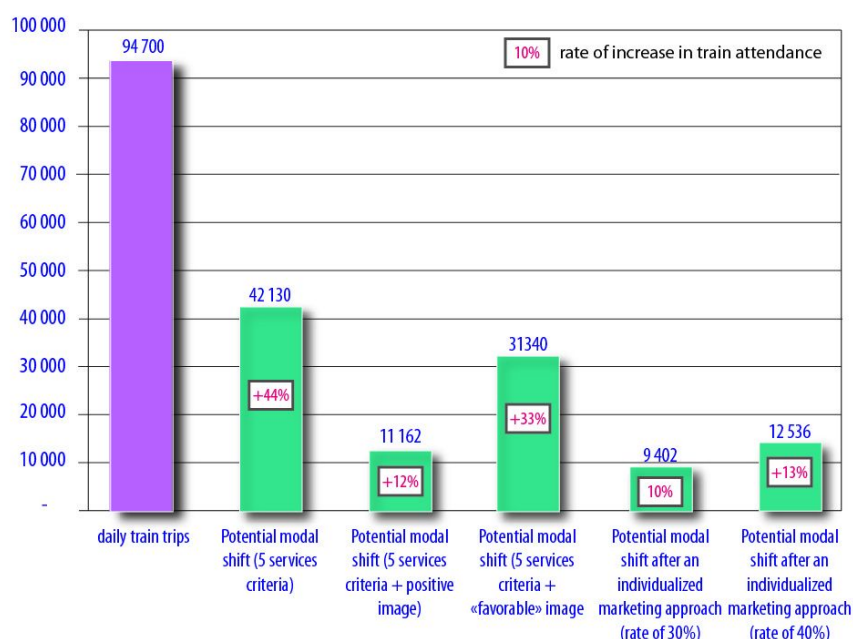
If we consider the mixed opinion, the negative adjectives mainly focus on train services quality (unreliability, insufficient services and high cost), utility and convenience expressed in terms of constraints and unsuitable services. As previously, we assess a volume of 31% trips which would be difficult to make by train.

To conclude, the modal shift evaluated on both supply and train perception criteria would be about 30,830 trips, that is to say a 7,4% modal shift rate of car trips with a train alternative. There would be a gain on train attendance estimated about 32%. Finally, the train image has a moderating influence on the modal shift rate since it leads to a decrease of 27% of the “traditional” modal shift evaluation.

## 5. Conclusion

Our work aims to analyze the influence of train image on the estimation of potential modal shift from car to train. There are three major lessons. The first one concerns the relevance of the estimated modal shifts. Although our results depend on the field perimeter, the different modal rates are within the ranges given by scientific work (between 5 and 15%) (Brög et al. 2009). Moreover, these rates have meaning when they are compared to the current railway traffic. Between 28000 to 38000 vehicles would be removed from the road network, these numbers correspond to significant challenges of increase of regional trains ridership. It will correspond to an increase from 5,000 to 21,000 additional passengers on the railway network. This important growth will primarily concern regional services. But the impact on trains running to Paris region may raises questions about the ability of rail services to absorb this additional traffic since some of these links are heavily busy routes.

fig.4 : number of train trips according scenarios of modal shift



The second learning relates to the influence of the train image on modal shift. Our simulations show that this factor leads to minimize the potential modal shift estimated on traditional factors of supply. We also evaluated the influence of management travel demand programs on this modal shift volume based on train image. Considering two individualized marketing approaches conducted in Northern France (Rocci 2014, elus-npdc eelv.fr<sup>1</sup>), the foreseeable modal shift would be about between 9,300 and 12,300 car trips. This would mean that, if some mobility management actions are implemented, we could expect a maximum of 30 to 40% shift of our modal shift forecasts. But there is no scientific reference to validate this order of magnitude. It thus leads to further research on this topic.

The third lesson concerns policy levers to change the image of the train, and thus to improve the potential of modal shift. Our research highlights the individual profiles and key topics on which acting. We saw that all car drivers do not have refractory opinion on the train. The analysis of train attributes emphasizes the need to act at least on three traditional subjects: train usefulness, its performance by comparison to the car (speed, cost), and convenience. We also noted the importance of positive emotional attributes (comfort, pleasant, relaxing, ...) and negative ones (crowded, uncomfortable, dangerous) that seem more

<sup>1</sup> Accessed January 11, 2016

to result from media or family representations, since 72% of our sample never use the train. These subjective attributes should be at the heart of targeted communications.

Then, our research has shown that the modal shift potential almost concerns exclusive daily train users. In addition to train perception, this result shows that there is a need to counter modal habits or routine in lifestyle. Buhler (2012) proves that the strength of habit may explain the resistance of users to change mode. Therefore, the impact of communication campaigns enhancing virtues and values of the train to bring down this mode resistance can be questioned (Buhler, 2012, Eriksson 2008). Beyond awareness and communication, communities may implement “hard” measures such as restrictions on car use. This questions the potential evolution of mobility behavior of routine car drivers faced with modal change injunctions. And raises to the following research issue: how could we suggest individuals to question their modal choices?

## **Bibliography**

- Bourg G., 2011. L'apport de la communication engageante et des représentations sociales dans le cadre de la promotion de l'éco-mobilité, University of Bourgogne, France.
- Brisbois X., 2010. Le processus de décision dans le choix modal : importance des déterminants individuels, symboliques et cognitifs », University of Grenoble, France.
- Brög W., Erl E., Ker I., Ryle J., Wall R., 2009. Evaluation of voluntary travel behavior change: experience from three continents, Transport Policy 10
- Buhler T., 2012. Eléments pour la prise en compte de l'habitude dans les pratiques de déplacements urbains : le cas des résistances aux injonctions au changement de mode de déplacement sur l'agglomération lyonnaise, INSA Lyon, France
- Cain A., Flynn J., McCourt M., Reyes T., 2009. Quantifying the importance of image and perception to Bus Rapid Transit, final research report
- Crozet Y., 2005. Le temps et les transports de voyageurs, European Conference of Ministers of transport, Belgium.
- Eriksson L., 2008. Pro-environmental travel behavior: the importance of attitudinal factors, habits and transport policy measures, Umea University, Sweden
- Flamm M., 2004. Comprendre le choix modal : les déterminants des pratiques modales et des représentations individuelles des moyens de transport, Ecole Polytechnique Fédérale de Lausanne, Switzerland.
- Hasiak S., Hasiak F., Egea A., 2016 (à paraître). Coach and Train: differences in individuals perception of these modes, Transport Research Arena conference
- Kaufmann V., Tabaka K., Guidez JM., Louvet N., 2010. Et si les Français n'avaient plus seulement la voiture dans la tête – évolution de l'image des modes de transport. Certu publications.
- Megel K., 2001. Bus oder Bahn ? Psychologische Untersuchung der Schemata und Präferenzen im Regionalverkehr, Technical University of Dresden, Germany
- Palmier P., SETRA, 2010. Logiciel de calcul d'accessibilité multimodale,
- Potomac Survey Research, for Montgomery County, 2000. Commuting behavior Research in Bethesda and Friendship Heights
- Rocci A., 2007. De l'automobilité à la multimodalité ? Analyse sociologique des freins et leviers au changement de comportements vers une réduction de l'usage de la voiture, Université of Paris 5, France
- Rocci A., Comment rompre l'habitude ? Le marketing individualisé, un levier des politiques publiques pour changer les comportements autosolistes, MSFS conference mars 2014
- Scherer M., Dziekan K., 2012. Bus or rail: an approach to explain the psychological rail factor. Journal of Public Transportation 15, 75-93.
- Vleugels I., Steenbergen T., Vande Walle S., Cornélis E., 2005. Déterminants des choix modaux dans les chaînes de déplacements, plan d'appui scientifique à une politique de développement durable