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## RESEARCH ARTICLE

# Travel Cost: Not Always the Most Important Element of Social Exclusion

Francesca Pagliara<sup>1,\*</sup>, Veronica De Pompeis<sup>2</sup> and Preston John<sup>3</sup>

<sup>1</sup>Department of Civil, Architectural and Environmental Engineering, University of Naples Federico II, Naples, Italy

<sup>2</sup>IBM, Client Innovation Center, Bergamo, Italy

<sup>3</sup>Transportation Research Group, University of Southampton, Southampton, UK

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### Abstract:

### Introduction:

Very few authors in the literature have dealt with the issue of social exclusion related to HSR systems.

### Methods:

A Revealed Preference survey has been delivered to English users of transport systems for long distances journeys in order to investigate their perception of HSR-related social exclusion.

### Results:

The main result of the survey is that a relationship between social exclusion and HSR in England is evident, especially in terms of economic and geographical exclusion.

**Keywords:** Social exclusion, High speed rail, Revealed preference survey, Economic exclusion, Geographical exclusion, High speed one.

## 1. INTRODUCTION

High Speed Rail (HSR) systems are currently considered as one of the most significant technological breakthroughs in passenger transportation introduced in the second half of the 20th century [1]. In 2014, there were more than 20,000 km of new High Speed Rail (HSR) lines in operation around the world, and they are going to be double by 2025, with a large number of projects under construction or at an advanced stage of planning.

The development of HSR projects in the United Kingdom is still a “work in progress”. Apart from the already operating line, the Channel Tunnel Rail Link (CTRL), now known as High Speed One (London St Pancras – Stratford International - Ebbsfleet International – Ashford International - Folkestone), the construction of the new High Speed Two railway will start in the coming years. It will link London Euston to Birmingham, and then, following a ‘Y’ shape, it will develop towards Manchester on the west and towards Leeds on the east. This project is very expensive. The first phase of HS2, between London and Birmingham, will cost around £16.3bn. The full Y-shaped network, including connections with the Channel Tunnel and Heathrow, will cost £32.7bn [2].

Most of the impacts brought by HSR systems have been widely examined in several papers presented in the literature [3 - 7].

It is conventional wisdom that the HSR implementation plays an important role in reshaping travel patterns and

\* Address correspondence to this author at the Department of Civil, Architectural and Environmental Engineering, University of Naples Federico II, Naples, Italy; Tel: 0039 081 7683932; E-mail: [fpagliar@unina.it](mailto:fpagliar@unina.it)

activities of people, consequently changing the ways cities develop. Many countries are investing in HSR systems only because they increase the transport infrastructure capacity and they provide a “green” transport alternative, but also because they promote economic growth and regional development. These are the undoubtedly advantages of fostering these new rapid services.

However, little attention has been paid to the question of social exclusion and HSR. This manuscript aims to fill this gap. Indeed the focus here is on the understanding, through an exploratory research carried out in England, the reasons why users are socially excluded from the HSR service.

High-Speed transportation is often socially excluding given that, in most countries, HSR travel is much more expensive than conventional services. HSR users may be expected to pay higher fares than classic rail or coach services. HSR fares may be lower than air fares (although this may not be the case where low cost carriers are present) and lower than out-of-pocket motoring costs where tolled motorways are present. However, intermodal comparisons may be distorted by indirect taxation [8]. HSR operators usually offer some deals following yield-management principles, including advance booking, off-peak travel, no flexibility, *etc.* Unfortunately, all these deals are rather on the fringe and involve less choice, more constraints and less flexibility. This has induced recurrent criticisms of HSR services, which are often supported by the elites but are not accessible to everyone [9].

In the literature concerning the case study of England, very few are the contributions focusing on the problems connected with the possible exclusion of some socioeconomic categories from the newly built HSR service. The objective of this paper is twofold: firstly, it aims at investigating the factors fostering users to choose HSR instead of the National Rail; secondly it examines whether HSR can be seen as a cause of social exclusion. The focus is on the relationships existing between the improvement in the HSR system technologies and the society and users in UK. Key questions of the research are: does a relationship between social exclusion and HSR systems exist? With the development and publication of an exploratory online survey, the authors have sought to get information about choices that people make when travelling for long-distance trips (over 50 miles), in order to understand what are the steps they follow in their decision-making process, and the factors they usually consider when planning journeys. Further perspectives of the research concern the development of strategies aiming at reducing the negative effects of new technologies as well as the social exclusion which derive from it. Attention is given to geographical exclusion and economic exclusion which will be better explained in section 3, since they are considered the two main negative effects of HSR. The focus is on the existence and quality of public transport services over an area, which is necessary to allow people, wishing to use HSR services, to have access to them regardless of how far they are from them. This manuscript is organised as follows. In section 2, the link between social exclusion and HSR is examined, reporting the very few contributions present in the literature. In section 3, the methodology adopted is reported while in section 4 the main findings of the survey. Are described conclusions and further perspectives are presented in section 5.

## 2. SOCIAL EXCLUSION AND HSR SYSTEMS

The term “social exclusion” has been explained by several authors. According to Silver (1994) social exclusion is *“A multidimensional process of progressive social rupture, detaching groups and individuals from social relations and institutions and preventing them from full participation in the normal, normatively prescribed activities of the society in which they live.”*

Indeed it is generally agreed that exclusion refers to a dynamic process and not necessarily to an end-result [10 - 12], *i.e.* “who” and “when” someone is excluded can change over time. It is important to make a difference between social exclusion and poverty since the two concepts are often used interchangeably. The concept of social exclusion is based on inclusion into civil society.

By poverty it is meant a condition characterised by severe deprivation of basic human needs, including food, safe drinking water, sanitation facilities, health, shelter, education and information.

Low-income categories are not necessarily experiencing social exclusion, since being excluded can be a form of deprivation with innate importance in addition to its causal relations with other issues. Social exclusion can in turn lead to other deprivations that can significantly decrease the quality of life [13].

Therefore, social exclusion is a state where an individual is not able to take part in the activities of civil society, considered normal and expected within society. By social inclusion, it is meant, on the other hand, the ability to participate adequately in society.

Poor transport options and alternatives can be a result of social exclusion and can also reinforce it. Transport is a factor of social exclusion because a lack in access prevents people from participating in work, educational activities, community events, *etc* [14].

Following the election of the Labour government in 1997 there was renewed interest in the UK in ameliorating the effects of social exclusion. A Social Exclusion Unit (SEU) was established to monitor and influence policy across all Whitehall Departments. In 2002 the Unit turned its attention to travel, transport and access, seeing these as processes implicated in the reproduction of social exclusion. The Report Making the Connections: Transport and Social Exclusion states that: "Recent years have seen a growing recognition that transport problems can be a significant barrier to social inclusion" [15].

In 2004, the FIA Foundation invited the Transportation Studies Group of the University of Westminster to undertake a study to compare the position of the G7 countries in relation to transport and social exclusion at the urban level [16]. In this report, no citation to HSR systems is made.

Among the very few studies present in the literature on the link between HSR systems and their impacts on social exclusion, the statistical analysis of surveys carried out by Cass *et al.* [17] reports interesting results. It indicates that HSR has both positive and negative social impacts. The positive social impact is represented by the increased accessibility and activities for commuting HSR users. The key concept of accessibility highlights the relationship between the system of activities localised in a certain territory and the transport system that serves it. According to Cascetta [18], the concept of accessibility may refer alternatively to the need to carry out some activities (shopping, work, education, *etc.*) by an individual who is in a certain area (active accessibility), or to the need to be physically reached by potential users (customers, employees, suppliers, *etc.*) for an activity that is located in a certain area (passive accessibility). The nature of accessibility is influenced by the time-space organization in households, the nature and performances of the transport system, and the nature of time-space organization of the facilities and opportunities individuals are seeking to access. According to the Cass *et al.*'s findings, HSR improves trips for working purposes by providing fast trains connection between main cities. On the other hand users who cannot afford HSR or live far from stations can be socially excluded and have problems, when searching for better jobs. The introduction of a public transport system plays an important role in the social exclusion or inclusion of "transport poor" populations. HSR might encourage a hyper-mobile society, which can abandon people without access to the fastest modes of transport. This can be avoided only through thoughtful policies.

The study carried out in Spain by Monzon *et al.* [19] shows the role played by the selection of the commercial speed. Indeed, an increase from 220 km/h to 300 km/h in a given corridor results in significant negative impacts on spatial equity between locations with and without a HSR service.

The same authors propose an assessment methodology for HSR projects following a twofold approach, *i.e.* addressing issues of both efficiency and equity. The procedure uses spatial impact analysis techniques and is based on the computation of accessibility indicators. Efficiency impacts are evaluated in terms of increased accessibility resulting from the HSR project, with a focus on major urban areas; and spatial equity implications are derived from changes in the distribution of accessibility values among these urban agglomerations [20].

The paper by Chen and Wei [21] reports the case study of Hangzhou East Rail station in China. This area is undergoing a rapid industrialization and thus workers' incomes are increasing significantly. However, HSR is still not affordable for the majority of the population.

Another contribution by Shi and Zhou [22] aims at analysing transportation equity change in terms of accessibility change experienced by cities served by the HSR line in China. The main research findings, from the equity assessment, reveal that investments in HSR systems do not have a strong impact in fostering social exclusion in terms of being excluded from the use of the new high speed infrastructure.

A revealed preference survey was carried out, interviewing users of the Italian transport network who were travelling for a variety of purposes, including road (car and bus), rail and HSR. In order to understand what prevents travellers from using HSR, factors other than cost have turned out to have an impact. Indeed, a mode choice model has been specified and calibrated, and the main outcome of the analysis is that geographical exclusion, *i.e.* low accessibility to the arrival/departure HSR station, is a relevant factor inhibiting users from choosing the service [23].

### 3. METHODOLOGY

The approach used in this study is based on collecting information about the factors having an impact when people plan a long distance journey, with particular attention to their decisions about the transportation mode choice. Specifically, users have been interviewed with reference to their last long-distance trip (more than 50 miles) travelling from and to different parts of Great Britain and Europe by different transport modes, including HSR.

In order to get these data, an online Revealed Preference (RP) survey has been prepared. The respondents have been approached *via* the web rail commuters’ forums, social network groups, which are linked to the main UK universities, and student forums and groups, where users share their experiences about travelling and commuting. The sample is made up of commuters travelling between London and the Kent, students travelling around the Kent, and people travelling between the UK and Brussels/Paris. The questionnaire was designed and put online through the i Survey platform, powered by the University of Southampton (UK). It was available from January until May 2015 and 359 useful completed surveys were collected during this period, which is a quite acceptable order of magnitude for the exploratory nature of the research. Due to the survey method used, based on the web platform, the sample needed to be weighted. The percentages of gender and age classes, based on the British Census data (Office for National Statistics, ONS), have been considered to adjust the sample. The authors tried to avoid any bias present in the data set used to make inferences. The percentages of age and gender distribution of the sample have been compared with the real ones, available on the ONS website.

Given the low number of participants who have chosen HSR, the authors decided to add some questions related to a Stated Preference exercise, in addition to the Revealed Preference one. In the hypothetical scenario, the HSR service has been presented to the participants with journey times 50% lower than the National Rail ones, but fares 20% higher; participants were asked if they would choose HSR in this case. The majority of the sample (60%) is divided between people saying “yes” and people saying “maybe”, but the percentage of people saying “no” is not negligible, being about 40% (Fig. 1). However, people who have already travelled by HSR seem to be more willing to use HSR, meaning that their experience with HSR (not necessary in England) has been positive.

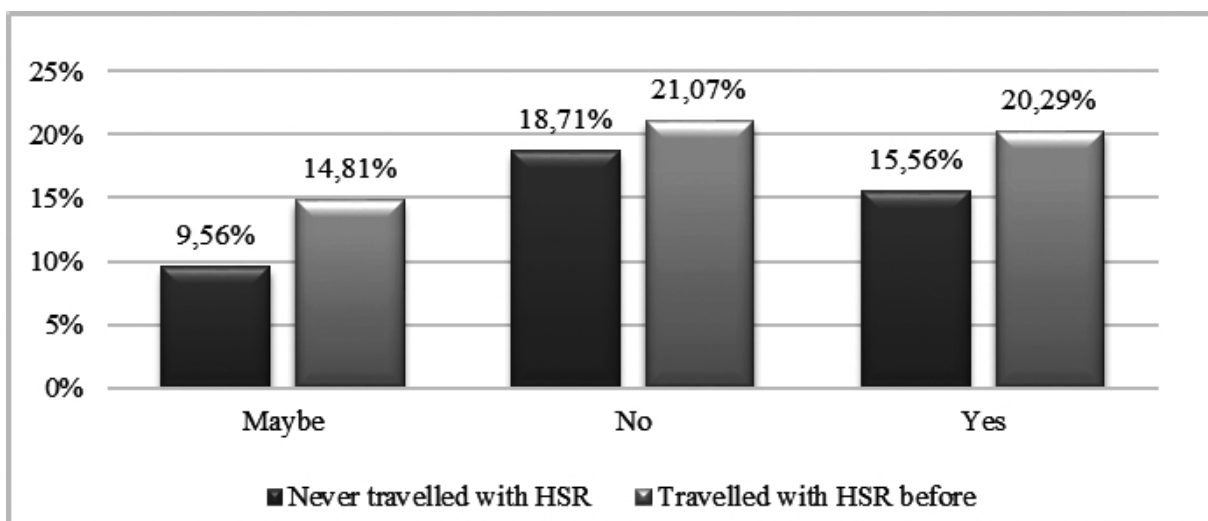
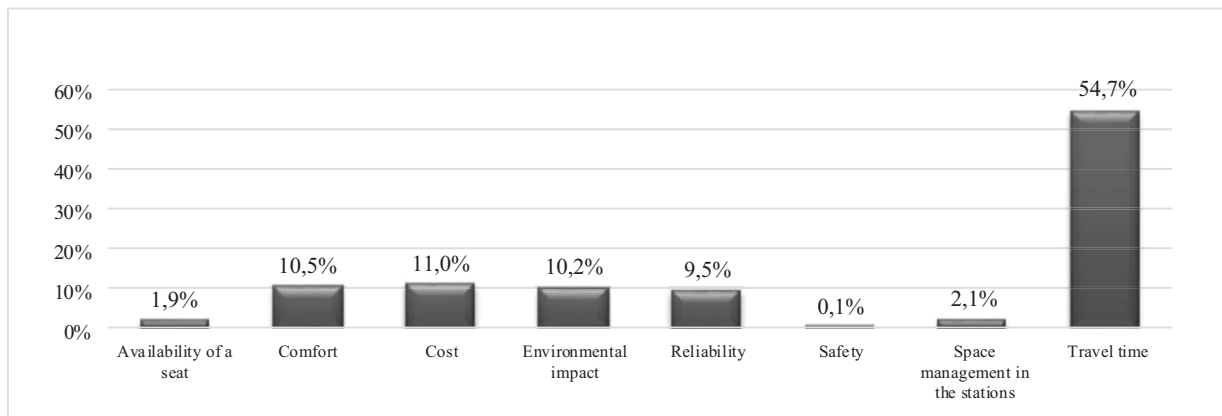


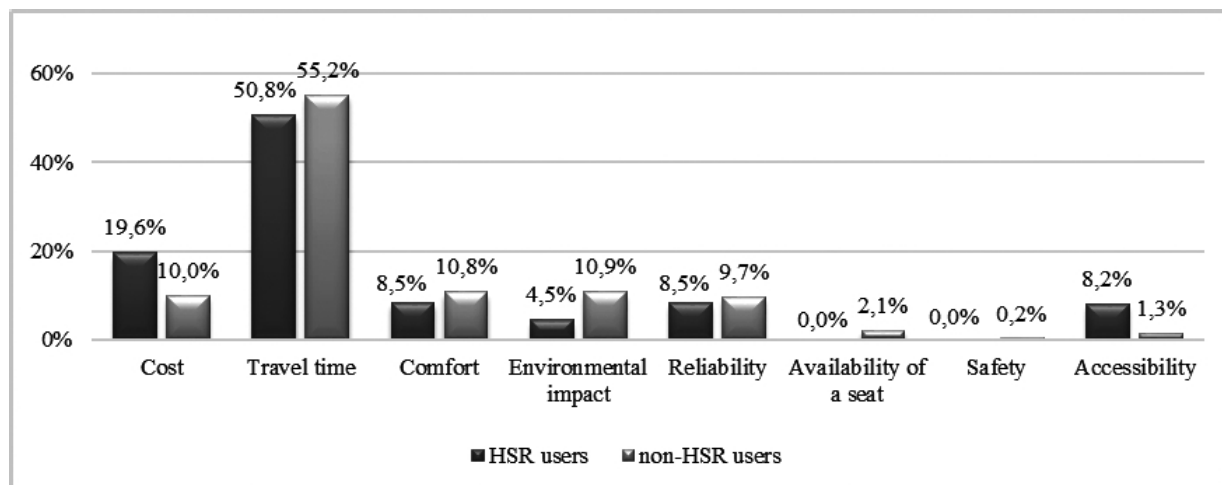
Fig. (1). Hypothetical scenario.

Participants were also asked to indicate the factors they think are favourable for the choice of HSR (Fig. 2). The majority of the sample (55%) think that travel time is the most favourable factor influencing this choice, while cost, on board comfort and environmental impact are the other significant factors (percentages between 10% and 11%). The influence of the travel time can probably be explained with the need for fast services with respect to long-distance trips. Reliability is perceived as a favourable factor by around 10% of the sample, and the less relevant perceived factors are accessibility and availability of a seat (both around 2%). Safety is barely perceived as being a factor.



**Fig. (2).** Favourable perceived factors for HSR.

The same analysis has been carried out making a distinction between HSR users and non-HSR users (Fig. 3). As previously noticed, travel time is the most significant favourable factor for the sample, perceived by 51% of HSR users and 55% of non-HSR users. Cost is the second most relevant factor for 20% of HSR users and 10% of non-HSR users. This difference is probably due to the supply of discounted fares for early bookings related to the fact that the journeys are mainly for holidays purposes, which makes the HSR cost competitive with respect to the alternative transport modes.



**Fig. (3).** Favourable factors for HSR vs type of users.

## 4. RESULTS

### 4.1. Who are those Excluded from HSR?

The socioeconomic characteristics of non-HSR users are reported in Table 1. Middle-aged and older travellers seemed to be more excluded from the HSR service particularly if compared to the younger class. No significant differences are revealed between genders. Respondents educated to a Masters graduate level are less excluded from HSR. On the contrary, among the occupation classes, full-time workers are the most excluded from HSR. “Lone” travellers seem to choose less frequently the HSR service, while people travelling with colleagues or friends prefer this transport mode with respect to the others.

Table 1. Socioeconomic characteristics of non-HSR users.

Characteristics	Levels	Non-HSR Users %
Age	18-21	7.10
	22-30	15.77
	31-40	14.29
	41-50	18.27
	51-65	21.63
	>65	22.95
Gender	M	50.02
	F	49.98
Nationality	British	56.61
	Other	43.39
Education	Bachelor Degree, Master Degree, PhD	38.11
	Other	61.89
Occupation	Doing paid work full-time	33.64
	Student	20.12
	Freelance	10.11
	Looking after home or family	7.49
	Unemployed	0.84
	Retired	27.64
	Other	0.16
	Monthly income	£0-£800
	£801-£1600	8.85
	£1601-£2500	8.63
	£2501-£3000	23.94
	>£3000	50.58
Travel Type	Alone	43.28
	Partner	18.21
	Colleague	8.39
	Friends	8.30
	Family	21.83

The categories of exclusion connected to transport and considered are the ones proposed by Church *et al.* [24] and adapted to this case study. They are:

- Physical exclusion: physical barriers, *i.e.* lack of disabled facilities or of timetable information, limiting accessibility to transport services.
- Geographical exclusion prevents people from accessing transport services, especially those living in rural areas or on peripheral urban estates.
- Exclusion from facilities results from low accessibility with facilities, like shops, schools, health care or leisure services.
- Economic exclusion represents the high monetary costs of travel preventing or inhibiting access to facilities or employment and thus having an impact on incomes.
- Time-based exclusion refers to other demands on time, like combined work, household and child-care duties, reducing the time available for travel.
- Fear-based exclusion refers to the fears for personal safety precluding the use of public spaces and/or transport services.
- Space exclusion is the security or space management preventing given groups having access to public spaces, like first class waiting rooms at stations.

Among these categories of social exclusion, the economic factor seems the most relevant, followed by the geographical one. Also physical and time-based exclusions are not negligible (Table 2). The results have been collected for the two types of users, and this highlights that both HSR users and non-HSR users feel the exclusion related to mobility, because the percentages are similar. Non-significant differences are present between men and women

perceptions, except for economic exclusion, which is more felt by non-HSR female users (32.60%) than by male ones (16.13%). This may be due to different social positions held by women compared to men, and it could reflect different treatments in terms of wages and conditions.

**Table 2. Church's perceived categories of social exclusion.**

–	Women		Men		Total	
	HSR Users	Non-HSR Users	HSR Users	Non-HSR Users	HSR Users	Non-HSR Users
<b>Geographical exclusion</b>	14.64%	6.70%	6.94%	17.34%	21.58%	24.04%
<b>Exclusion from facilities</b>	1.36%	0.80%	4.13%	4.08%	5.49%	4.88%
<b>Economic exclusion</b>	37.82%	32.60%	14.09%	16.13%	51.90%	48.73%
<b>Physical exclusion</b>	7.05%	3.85%	7.07%	6.06%	14.12%	9.91%
<b>Spatial exclusion</b>	0.00%	0.16%	0.00%	1.22%	0.00%	1.38%
<b>Time-based exclusion</b>	2.17%	5.87%	4.75%	5.20%	6.91%	11.07%
<b>Fear-based exclusion</b>	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
<b>Total</b>	<b>63.02%</b>	<b>49.99%</b>	<b>36.98%</b>	<b>50.01%</b>	<b>100%</b>	<b>100%</b>

Geographical exclusion also shows the same result between men and women, with inverted percentages with respect to HSR users and non-HSR users. Women consider themselves geographically excluded much more when they use HSR than when they do not (14.64% as HSR users against 6.70% as non-HSR users), while for men the perception is exactly the opposite (6.94% as HSR users against 17.34% as non-HSR users). This is probably due to different habits and locations chosen as origins and destinations for their journeys.

Cross tabulations have been provided in order to assess the relationships between social exclusion and some typical socioeconomic characteristics and mobility-related choices, such as the monthly household income, the chosen transport mode and the trip purpose.

Table 3 shows Church's seven categories of social exclusion related to the respondents' monthly income. People with low and medium income mainly highlight economic exclusion, as expected. Moreover, 65% of the sample experience economic exclusion more strongly than the other categories. There is no significant difference with income for geographical exclusion, and 13% out of the whole sample have declared they feel geographically excluded.

**Table 3. Church's categories of social exclusion vs monthly income.**

–	Physical Exclusion	Geographical Exclusion	Exclusion from Facilities	Economic Exclusion	Time-based Exclusion	Fear-based Exclusion	Spatial Exclusion
<b>Low and medium monthly income</b>	5.3%	6.3%	0.0%	34.5%	1.7%	0.0%	0.3%
<b>High monthly income</b>	2.4%	7.1%	1.6%	30.7%	10.1%	0.0%	0.0%
<b>Total</b>	<b>7.7%</b>	<b>13.4%</b>	<b>1.6%</b>	<b>65.2%</b>	<b>11.7%</b>	<b>0.0%</b>	<b>0.3%</b>

Church's categories of exclusion related to the transport mode chosen by the respondents are reported in Table 4. With regard to economic and geographical exclusion, the highest percentages are registered in correspondence of National Rail. This is probably due to the fact that National Rail is the most used transport mode by the sample. National Rail users basically are not wholly satisfied with it, in terms of economic convenience and, in a more minor measure, geographical accessibility, but they recognise that National Rail is often better than travelling by car or bus.

**Table 4. Church's categories of social exclusion vs transport mode.**

–	Physical Exclusion	Geographical Exclusion	Exclusion from Facilities	Economic Exclusion	Time-based Exclusion	Fear-based Exclusion	Spatial Exclusion
<b>Bus</b>	1.0%	3.4%	1.4%	13.5%	1.5%	0.0%	0.3%
<b>National Rail</b>	11.7%	22.7%	7.4%	60.6%	4.9%	0.0%	0.0%
<b>Car</b>	6.3%	21.6%	1.0%	20.5%	14.7%	0.0%	2.1%
<b>Plane</b>	0.8%	0.3%	0.0%	2.9%	1.0%	0.0%	0.3%
<b>Total</b>	<b>19.8%</b>	<b>48.1%</b>	<b>9.8%</b>	<b>97.4%</b>	<b>22.1%</b>	<b>0.0%</b>	<b>2.7%</b>

Table 5 shows that the highest percentages of economic and geographical exclusion are reported in undertaking a range of other activities as trip purpose, which encompasses all sort of personal business, like shopping, visiting a doctor, friends, relatives, going to the bank, entertainments.

Table 5. Church’s categories of social exclusion vs trip purpose.

–	Physical Exclusion	Geographical Exclusion	Exclusion from Facilities	Economic Exclusion	Time-based Exclusion	Fear-based Exclusion	Spatial Exclusion
Commuting	1.9%	4.6%	3.5%	10.9%	6.9%	0.0%	0.4%
Holidays	8.1%	5.3%	0.0%	18.0%	2.4%	0.0%	0.7%
Study	1.5%	8.1%	0.0%	10.8%	0.3%	0.0%	0.3%
Other activities	8.2%	30.0%	6.2%	57.7%	12.5%	0.0%	1.4%
Total	19.8%	48.1%	9.8%	97.4%	22.1%	0.0%	2.7%

CONCLUSIONS AND FUTURE PRESPECTIVES

In this paper, the relationship between the choice of HSR and social exclusion is analysed. As highlighted in some case studies present in the literature on the benefits emerging from the implementation of a new HSR service, it is necessary to investigate also on the possible social exclusion brought by these systems.

The motivations, fostering the choice of HSR by a sample of English travellers, have been analysed together with the factors inhibiting them from the use of this service.

The results of a Revealed Preference survey have shown that only some of the criteria proposed are perceived by the users and among them two are the most relevant: economic and geographical exclusion.

Specifically, users travelling alone tend to choose HSR because of the reduced travel time. Moreover, the cost has an impact on the choice of this service because of the early booking convenient fares, which allows saving money for those travelling within given time periods.

On the other hand, non-HSR users feel mainly economically excluded, because the HSR ticket is expensive and geographically excluded, *i.e.* they have low access to the departure/arrival stations. In UK HSR is not considered a real alternative transport mode, therefore the results obtained, confirm this behaviour.

The hypothetical scenario presented in the survey allows further consideration (Fig. 4). Almost 60% of the sample has declared to be willing to use the HSR services if they were available for their journey, with ticket cost and travel time as proposed (people answering “yes” or “maybe”). On the other hand, about the half of these potential HSR users are people who currently use National Rail (Fig. 4), which means that they would not notice a great difference between HSR and conventional train services, due to already mentioned actual efficiency and convenience of National Rail services.

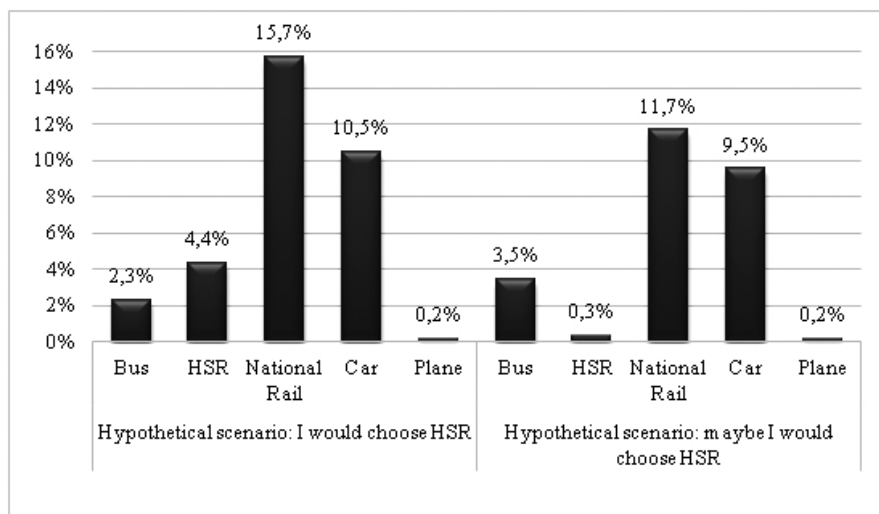


Fig. (4). Potential HSR users.



A solution would be the promotion of initiatives that can increase accessibility to the stations and more widely to the whole transport network, through an efficient and reliable public transport system, which reduces also the costs, or at least adjust the ticket fares according to the users' socioeconomic characteristics [25].

Further perspectives will consider the calibration of a mode choice model, taking into account a choice set definition model of the alternatives considering also the seven Church *et al.*'s criteria of social exclusion.

## CONSENT FOR PUBLICATION

Not applicable.

## CONFLICT OF INTEREST

The authors declare no conflict of interest, financial or otherwise.

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Declared none.

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