EXPLAINING PUBLIC TRANSPORT INFORMATION USE THROUGH ATTITUDE THEORY: AN EMPIRICAL INVESTIGATION

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Abstract

Despite recent investments in and growing availability of various public transport information sources, levels of apparent non-use (of particular services) across the population remain high. Policymakers and information service providers could benefit from a better understanding of factors affecting information use. The goal of this paper is to provide more insight into the (non-)use of public transport information by applying attitude theory.

Looking up public transport information can be classified as a goal-directed behaviour: people consult information as a means to an end. The *Extended Model of Goal-directed Behaviour* (EMGB) is founded on the notion that behaviours are selected because of their perceived usefulness in achieving a goal. Individuals develop a motivation to act (behavioural desire, here: a desire to consult public transport information) which is affected by: attitudes (towards consulting public transport information), past experience (concerning information use), perceived behavioural control (an individuals' confidence in being able to consult information), and subjective norms (perceived encouragement by important others to consult information). The EMGB is applied and extended with other factors to account for constraints, such as trip context and habitual travel behaviour.

A postal survey was sent to a random sample of 10,000 households in Bristol and Manchester, UK. The response rate was 13% (n=1327). Respondents were questioned about an uncertain journey they were going to make. Structural equation modelling has been used to investigate interdependencies among the factors studied.

The results show that the desire to consult public transport information for an uncertain journey is affected by attitudes, subjective norms, past experience, and perceived behavioural control. These social-psychological constructs are in turn affected by other factors such as travel behaviour and trip context.

1. Introduction

From the late 1990s onwards as the Internet and mobile telecommunications have become mainstreamed into society and with, in the UK, an explicit policy emphasis on improving public transport and information for passengers (DETR, 1998), there have been considerable developments in the provision of and accessibility to travel information. Various forms of travel information services now exist which offer the possibility for people to make better informed travel choices. While some services support the motorist in route planning and route guidance, others (notably available through web access) relate to public transport journey planning. Further still, services now exist that offer the possibility of planning multimodal public transport journeys or indeed that allow door-to-door journeys by car and public transport to be planned and compared.

However, while certain information services in the UK are reporting annual enquiries running into the millions such levels of use can appear low in relation to the total volume of travel and it is clear that at least at the level of specific information services, the number of non-users continue to (heavily) out-weigh the number of users. Lack of awareness is only one of a variety of factors affecting travel information use (Goulias et al., 2004); habit, for example, is another important factor (Verplanken et al., 1997). Moreover, awareness does not necessarily lead to use (GfK NOP, 2007;

Peirce and Lappin, 2004). For service providers to realise the full potential of their services insofar as this is reflected in levels of use, it is important that such factors are identified, yet little is known presently about their precise nature.

Allied to a need to better understand factors affecting travel information use in general, there has been little if any specific consideration of why people do not use *public transport journey planning information services* (as much as might be expected or desired by policymakers). This is especially important in a policy environment where travel behaviour change towards greater public transport use is seen as one key aspect of mitigating congestion.

Although some studies have investigated the requirements for public transport (PT) information via stated and revealed needs (AEA, 2007; Cain, 2007; Chorus et al., 2007; Grotenhuis et al., 2007; Ipsos MORI, 2006; Molin and Timmermans, 2006), most of these studies tend to be descriptive rather than explanatory, while only taking sociodemographics into account. Yet sociodemographics could be poor proxies for the underlying behavioural and attitudinal characteristics of individuals which may actually determine travel information use (Chorus et al., 2006a). There has also been relatively little attention given to the social context for information (non-)use.

This paper aims to apply attitude theory to gain a better understanding of factors affecting PT information use and non-use[1]. It not only seeks to identify various social-psychological factors that affect information use, but also to assess their *relative* importance and how they act *together*.

The Extended Model of Goal-directed Behaviour (EMGB) is based on the utilitarian notion that people act because they ultimately would like to achieve certain goals (Perugini and Conner, 2000). It has been successfully applied in the past to explain dieting, studying, and the decision to buy products online or in-store (Perugini and Conner, 2000; Farag, 2006). Looking up public transport information can be classified as a goal-directed behaviour: people consult information as a means to an end, for example, making a journey successfully. Accordingly we have applied the EMGB to our examination of information (non-)use.

A limitation of the EMGB is that it implicitly assumes that the social-psychological mechanisms work in the same way for every individual across different geographical and social contexts. However, constraints (such as trip context and habitual travel behaviour) could affect these mechanisms and play an important part in an individual's choice process. Therefore, external factors that represent potential constraints (or, indeed, facilitators) are added to the EMGB in its application, providing an integrated model of social-psychological constructs and other factors such as, in this case, trip context.

Previous research has shown that people acquire PT information mostly for unfamiliar trips, arrival time-sensitive trips (such as some business trips), longer distance trips, and leisure trips (AEA, 2007; Farag and Lyons, 2008a; GfK NOP, 2007; Ipsos MORI, 2006). Consequently, respondents in our study were asked questions about a specific unfamiliar or uncertain journey (e.g., because the journey is not regularly made or is arrival time-sensitive). Data were collected via a postal survey that was sent to a random sample of 10,000 households in the city of Bristol and the Greater Manchester area, UK. The response rate was 13% (n=1327) and 642 respondents who indicated they were going to undertake such an uncertain journey were included in the analysis. Structural Equation Modelling (SEM) was employed to investigate assumed interdependencies among the factors studied. In SEM, a variable can be both an outcome variable and an explanatory variable at the same time. SEM also enables the relationships between variables to be decomposed into total, direct, and indirect effects (Jöreskog and Sörbom, 2001).

In the next section, the EMGB is introduced. This is followed by the study methodology in section 3. The results are given in section 4 and their implications are discussed in section 5.

2. Theoretical framework

The EMGB has its roots in attitude theory, namely in the Theory of Planned Behaviour (Ajzen, 1991). This theory states that intention (in the case of this article the intention to look up PT information) is a direct determinant of behaviour and that intention in turn is determined by *attitudes*

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[1] Indeed it will later emerge because of the nature of the empirical evidence gathered that insights principally concern information relating to rail travel.

(the degree to which one has a favourable or unfavourable evaluation of consulting PT information), *subjective norms* (the perceived encouragement by important others, such as family and friends, to consult PT information), and *perceived behavioural control* (the perceived ease or difficulty of consulting PT information).

The EMGB has added new predictors to intentions and, in turn, behaviour (Perugini and Conner, 2000). *Past behaviour* refers to the amount of past experience of performing a particular behaviour. The more often it has been performed (implying a known degree of success in doing so), the more likely an individual is willing to execute the behaviour (e.g., consulting PT information) again. *Goal desire* refers to the strength of an action's end state or the personal value that is attached to a certain goal outcome. This could be, for example, to reach a certain destination successfully in order to perform activities there. *Goal perceived feasibility* is defined as the ease or difficulty of reaching the end state. *Anticipated emotions* represent positive or negative emotions in respectively achieving or not-achieving a certain goal for which the behaviour is instrumental. These are goal-related variables, since they express how people would feel if they achieve their goal or fail to do so.

Constraints could affect the behavioural mechanisms described above (Farag, 2006) and could play an important part in consulting PT information. Therefore, factors that represent potential constraints (or facilitators) are added to the EMGB, providing an integrated model of social-psychological constructs with contextual factors. We have classified these external factors as follows: (i) travel behaviour (e.g. car use, public transport use);(ii) travel attitudes (e.g. towards car use and public transport use); (iii) trip context (e.g. arrival time-sensitivity, size of travel party); (iv) information factors (e.g., the ease of obtaining, understanding, and trusting PT information via telephone, website, and timetable leaflets); (v) social surrounding (e.g. knowing many people who regularly use public transport, receiving a recommendation to use a particular PT information service by word-of-mouth); and (vi) sociodemographics (e.g. gender, education) (for more information on the researched external variables see Farag and Lyons (2008b)).
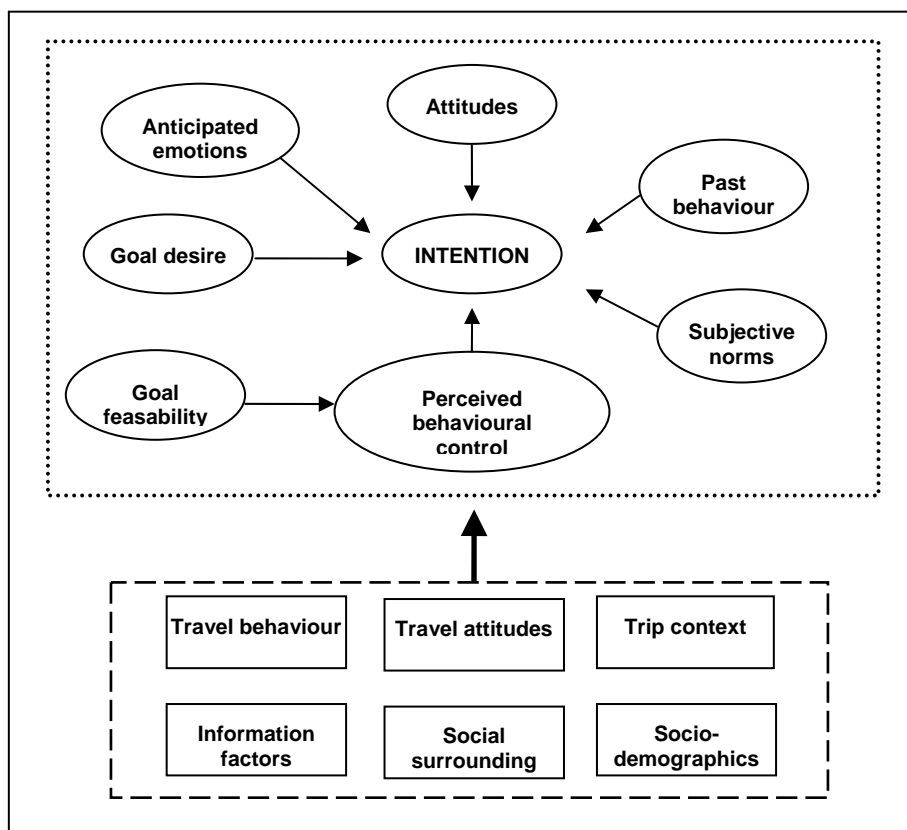

Figure 1   The Extended Model of Goal-directed Behaviour (EMGB)
(Perugini and Conner, 2000) expanded with external factors

Figure 1 represents the theoretical framework that has guided the analyses. Three different models have been estimated that represent different behavioural mechanisms: 1. the EMGB without any external variables (to investigate the importance of social-psychological constructs for PT information use), 2. a 'contextual' model with only external variables (to investigate the *direct* link

between such factors and information use), and 3. an integrated model (depicted in Figure 1) of the EMGB expanded with external factors (to better understand via which social-psychological constructs any effects of external variables occur *indirectly* on PT information use). For simplicity, all external variables are depicted together affecting the EMGB as a whole. However, the effect of each individual external variable on each individual social-psychological construct has been systematically researched (e.g. the effect of various indicators of trip context, such as distance and trip purpose, on attitudes and on subjective norms). Due to the inclusion of different variables, it is not possible to assess formally which model explains the intention to consult PT information best in statistical terms. However, each model provides insight in the different behavioural mechanisms underlying the (non-)use of PT information when planning an uncertain journey.

3. Methodology

A travel information survey was designed and piloted among fifty people. The main topics covered were: personal travel behaviour, public transport information awareness and use, attitudes towards travel and PT information use, and sociodemographics. The questionnaire took approximately twenty minutes to fill out. A random sample of 10,000 households in Bristol (5,000) and Greater Manchester (5,000) in the UK was then selected via the municipalities' population administration and received the postal survey at the beginning of December 2007. A post card reminder was sent two weeks later. Only one person aged 18 or over could participate per household. The overall response rate was 13% (n=1327). (The questionnaire could also be filled out online by those receiving an invitation to participate, but only 6% of the total response sample did so.)

One section of the questionnaire was called: "Making an uncertain journey: what would you do?". Respondents were asked to think about a journey they would be making in the future within the UK from their home. The following examples were given of an uncertain journey: (i) a journey you do not regularly make; (ii) a journey to an unfamiliar destination; and (iii) you have to arrive at a specific time, but are uncertain if you will make it on time. It was emphasized that the respondents should try to think of a journey for which they have *not* (yet) consulted any travel information. The majority (65%) of respondents indicated they had such a journey in mind. The analysis has been restricted to those respondents who have access to a car in their household to ensure that a choice between car and public transport is available to them and thus concerns 642 respondents. To get more insight into the 'uncertain' journey respondents were going to make, the following trip characteristics were asked about: (i) when the journey was expected to be made; (ii) trip purpose; (iii) destination; (iv) distance; (v) number of people travelling with; (vi) type of travel party (e.g. family, friends, colleagues); (vii) number of nights staying at the destination; (viii) arrival time-sensitivity of the trip; (ix) number of times this trip had been made before in the past year; and (x) preferred mode of transport for making this trip.

Two-thirds of the analysis sample are from Bristol, 55% is female and the average age is 48 years. Half of the respondents have a high education (i.e. an academic degree), while 36% have a high income (i.e. a net household income per month of more than 2,500 GB pounds). See Farag and Lyons (2008b) for more information about the total sample and exact definition of the external variables depicted in Figure 1. The frequency distribution and operationalisation of variables included in the analysis are given in Table 1.

Structural Equation Modelling (SEM) was chosen as the method of analysis because of the assumed interdependencies between the various factors studied and to better understand directions of influence. In SEM, a variable can be both dependent (that is, an outcome variable) and independent (that is, an explanatory variable) at the same time. Moreover, SEM distinguishes between direct, indirect, and total effects (Jöreskog and Sörbom, 2001). A total effect consists of one direct and one or more indirect effects. An SEM analysis consists of two parts: a measurement model and a structural model. In the measurement model, latent variables are explained by their indicators (observed variables). In the structural model, relationships between the latent variables can be modelled. The structural model captures the regression effects of exogenous (independent) variables on endogenous (dependent) variables, and the regression effects of endogenous variables on each other.

Covariance analysis was used to estimate the coefficients in an SEM model. A model covariance matrix was fitted on a sample covariance matrix, while iteratively minimizing the differences between the model-implied and observed values. Maximum likelihood estimation was used as the

method of estimation. In addition to a covariance matrix, an asymptotic covariance matrix was calculated as input for the analysis. In this way, standard errors and chi-squares were corrected for non-normality (Jöreskog, 2005). A disadvantage of constructing an asymptotic covariance matrix is that a listwise deletion procedure is applied, which resulted in many missing cases (18%). Therefore, we imputed values for missing items using the technique of Expectation Maximization (EM), which substitutes values for missing data through a maximum likelihood estimation procedure (Olinsky et al., 2003). Non-recursive structural equation models with latent variables were estimated using LISREL software version 8.72 (Jöreskog and Sörbom, 2001). The measurement model and the structural model were estimated simultaneously.

Table 1   Frequency distribution and definition of variables included in the analysis

Variables		N	%	Mean	SD
EMGB constructs					
Intention					
I want to look up public transport information in planning this journey	0 false -10 true	642		4.60	4.01
My desire to look up public transport information in planning this journey can be described as:	1 no desire 2 very weak 3 weak 4 modest 5 strong 6 very strong desire	642	38 9 8 13 21 11		
Attitudes					
I think that to look up public transport information in planning this journey would be:	1 useless - 7 useful	608		4.21	2.46
I think that to look up public transport information in planning this journey would be:	1 unhelpful - 7 helpful	600		4.18	2.28
Subjective norms					
People who are important to me .... encourage me to look up public transport information in planning this journey.	1 would not - 7 would	635		3.82	2.33
People who are important to me .... care if I looked up public transport information in planning this journey.	1 would not - 7 would	632		3.57	2.24
Past behaviour					
How many times did you look up public transport information this year (2007) in planning a similar journey?	0 never 1 only once 2 a few times 3 many times	642	32 14 34 20		
External variables					
How often do you normally travel using the following types of transport? Car or van (as driver)	0 less often or never 1 at least once a week	642	10 90		
Train	1 less often or never 2 at least once a year 3 at least once every 3 months 4 at least once a month	642	33 28 19 19		
What is the purpose of this journey?	work	642	24		
If I am travelling with friends I prefer to go by car rather than by public transport	1 strongly disagree – 7 strongly agree	631		5.13	1.82
Have other people (for example, colleagues, family, or friends) ever *recommended* the use of a particular PT information service to you?	0 no 1 yes	642	71 29		

4. Results

Description of trip context and preferred travel mode

Before turning to the results of the SEM analyses, we describe the types of 'uncertain journeys' that respondents indicated they were planning to make and their preferred mode of transport.

The majority of uncertain journeys (39%) were to visit family or friends, 24% were for work purposes, 22% had a holiday purpose, and 15% were a leisure trip (e.g. shopping, evening out). Nearly two-thirds (63%) of the trips had a distance of over a hundred miles, with only 15% of all trips being under fifty miles. Over a third (36%) of the respondents said they would be travelling alone on this uncertain journey, 30% with another person and 34% with two persons or more. Half of the trips involved an overnight stay of up to three nights, whereas nearly one-third (31%) of all the planned trips was a day trip (the rest of the trips involved an overnight stay of more than three nights). Respondents were asked how important it was in making this journey that they would arrive at a certain time (1=not important, 7=very important). Slightly more than half (53%) of the respondents indicated that their journey was arrival time-sensitive. Some examples of uncertain journeys respondents said they were going to make are: a work trip to Preston with a colleague (distance 25 – 50 miles), a leisure trip to Glossop with a friend (distance less than 25 miles), a holiday in the Lake District with adult family members and children (overnight stay of more than a week, distance less than 100 miles), travelling alone to Weymouth to visit family or friends (no overnight stay, distance 101 – 150 miles), a holiday in Torquay with friends and an overnight stay of up to 3 nights (distance 101 – 150 miles).

The majority (66%) of respondents indicated that (in advance of consulting any travel information) they would prefer to make this uncertain journey by car, whereas 28% indicated they would prefer to travel by train. Indeed it is important to note that in the majority of cases respondents had identified an uncertain journey such that PT information would mostly concern that for rail travel. The subsequent results must be seen in this light.

Preferred mode of transport is a very important determinant of looking up PT information. Of those respondents who indicated that they preferred to make an uncertain journey by public transport only 10% indicated that they would *not* look up PT information. More than one-fifth (22%) of the respondents who indicated that the car would be their preferred travel option also said they would look up PT information. Furthermore, of those respondents who prefer the car, 15% indicated they would be willing to make this journey by public transport, while 7% neither agreed or disagreed with this statement. Breaking the analysis down to trip purpose shows that work (29%) and leisure (33%) trips are the most likely type of uncertain journey where respondents indicate they would consult PT information, even though the car is their preferred travel option. Meanwhile only 16% of the respondents with car as their preferred travel mode who were planning a visit to family or friends said they would consult PT information.

The paper now moves to examine the results of our analyses in terms of other factors affecting the intention to look up public transport information for uncertain journeys.

Outcomes of estimating the EMGB without the inclusion of external factors

The EMGB *in the absence of external factors* explains the intention to use PT information reasonably well, if looking at the overall model fit (RMSEA[2]=0.036) - see Table 2 for the measurement model and Table 3 for standardized coefficients which enable a comparison of the magnitude of the effects of the various EMGB constructs. The model fit improved considerably when only cognitive attitudes (consulting PT information is seen as useful and helpful) were included in the analysis, instead of together with affective attitudes (consulting PT information is seen as interesting and pleasant). This is unsurprising, given that travel information use is typically a behaviour carried out to achieve an underlying goal, rather than for its own sake.

The more useful consulting information is perceived to be, the stronger the intention to actually do so. The main reason why consulting PT information is perceived to be useful is when people actively consider travelling by public transport. Other social-psychological factors that affect the

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[2] The Root Mean Square Error of Approximation (RMSEA) is based on chi-square values and measures the discrepancy between observed and predicted values per degree of freedom. A good model has an RMSEA value of less than 0.05.

intention to consult PT information for an uncertain journey are subjective norms and past behaviour. The more encouragement respondents would expect from important others to consult information and the more often they have looked up PT information for a similar journey in the past year, the stronger their intention is to do so (again). Perceived behavioural control was not found to be statistically significant. This means that the perceived ease or difficulty of consulting PT information in itself does not directly affect the intention to consult information. Other social-psychological factors such as attitudes and past behaviour are more important, together with preferred travel mode. No statistically significant effects were found from the goal-related EMGB constructs, such as anticipated emotions. Perhaps, the relationship between making a journey 'successfully' (which could be an underlying goal for travel information use) and consulting travel information is more distal compared to other behaviours that have been studied using the EMGB (for example, body weight regulation). This said, in other research it has been noted that people are inclined to consult travel information if, given their level of knowledge without doing so, they anticipate an unacceptable level of regret at the outcome (Chorus et al, 2006b).

Table 2   Measurement model: standardized parameter estimates of the observed indicators for the latent variables (significance at least $p < 0.001$)

Latent variables	EMGB	Contextual Model	Integrated Model
Intention			
I want to look up public transport information in planning this journey (0=false, 10=true)	1.673	1.546	0.964
My desire to look up public transport information in planning this journey can be described as: (1=no desire, 6=very strong desire)	2.228	2.411	0.977
Attitudes			
I think that to look up public transport information in planning this journey would be: (1=useless, 7=useful)	2.891		0.984
I think that to look up public transport information in planning this journey would be: (1=unhelpful, 7=helpful)	1.865		0.921
Subjective norms			
People who are important to me (1= would not, 7= would) encourage me to look up public transport information in planning this journey.	2.437		0.989
People who are important to me (1= would not, 7= would) care if I looked up public transport information in planning this journey.	1.580		0.785

Outcomes of estimating a contextual model only (i.e. assessing external factors' effects)

To determine the effect of people's wider social and behavioural context on PT information use, a 'contextual' model was estimated (RMSEA=0.021) in which external variables *directly* affect the intention to consult PT information (and in which EMGM predictors of intention are *not* included).

The results show that of the external factors, travel behaviour has the strongest effect on the intention to look up PT information when planning to make an uncertain journey (see Table 3). Frequent car users are less likely to consult PT information, whereas frequent train users are more likely to do so in the context of making an uncertain journey. Additionally, a preference for car rather than public transport when travelling with friends has a negative effect on the intention to consult PT information. Trip context also affects the intention to consult information: respondents who are planning to make a work trip have a stronger intention to look up PT information compared to respondents making other types of trips. Word-of-mouth has a positive effect on the intention to consult information: respondents who said they were recommended to use a particular PT information service by people they know have a stronger intention to look up PT information when they are planning to make an uncertain journey.

Information factors and sociodemographics did not have a statistically significant effect on the intention to use PT information when planning to make an uncertain journey. The first outcome is in

line with the lack of a statistically significant effect of perceived behavioural control on information use, while the second outcome seems to suggest that other external factors (i.e., travel behaviour, travel attitudes, trip context, and social surrounding) are more important than sociodemographic characteristics.

Outcomes of estimating an integrated model

In order to better understand *why* the external variables described above affect the intention to consult PT information, we have analysed to what extent they influence the various EMGB constructs (and, thus, indirectly the intention to consult information). A description is given below, based on the integrated model (depicted in Figure 1) of how external variables affect attitudes, subjective norms, and past behaviour, as well as how these social-psychological factors are related to each other.

The results of the integrated model (RMSEA=0.028) show that attitudes are positively affected by past behaviour. Respondents who have consulted PT information for a similar journey in the past hold a positive attitude towards consulting information. There seems to be a general reinforcement of attitudes and behaviour when it comes to PT information use. Additionally, if people prefer to travel by car when travelling with friends, then they (unsurprisingly) are less positive about consulting PT information. Frequent train users hold more positive attitudes towards information use, as do respondents who received a recommendation to consult a particular PT information service.

It was found that attitudes affect subjective norms more strongly than the other way round. Respondents who hold a positive attitude towards consulting PT information say more often they would be encouraged to consult PT information by people important to them. It may be that respondents try to avoid cognitive dissonance by stating that people who are important to them would support their positive attitude towards consulting PT information. Past behaviour also affects subjective norms: respondents who have looked up PT information for a similar journey in the past are more likely than others to say that people would encourage them to consult PT information when making an uncertain journey. It could be because they have experienced encouragement in the past from important others. Meanwhile, respondents planning to make an uncertain work journey indicate more often that important others would not care whether they consulted PT information or not compared to respondents making other types of uncertain journey. It seems likely that important others are less involved when it concerns a trip for work compared to private trips such as a leisure trip, a holiday, or a visit to family or friends.

The negative effect of a work trip on subjective norms is counterbalanced by a positive effect of planning a work trip on past behaviour (leading to a total positive effect of planning a work trip on the intention to consult PT information, see Table 3). Respondents who are planning a work trip indicate more often than others that they have looked up PT information for other work trips in the past. This finding supports earlier research showing that people are likely to consult travel information for business trips (AEA, 2007; Ipsos MORI, 2006). However, train use has the strongest effect on past behaviour (i.e. use of travel information): frequent train users have consulted more often PT information when making a similar uncertain journey in the past than infrequent train users. Furthermore, frequent car users have consulted PT information less often in the past when making a similar uncertain trip. Finally, respondents who received a recommendation about a particular PT information service from others indicate more often that they have consulted PT information for similar uncertain journeys in the past.

Summary

Attitudes are by far the strongest explanatory factor for PT information use. If people think it is useful to consult PT information, they express a strong intention to do so. It seems that the main reason for perceiving PT information to be useful is when people consider travelling by PT. Attitudes towards consulting PT information are positively influenced by the number of times one has consulted PT information in the past for a similar journey, frequent train use, and by having received a recommendation to use a certain PT information service by others.

5. Conclusions

Although recent developments in public transport (PT) information provision and availability have been extensive, concerns have more recently emerged regarding levels of non-use of information

services. This paper has demonstrated how attitude theory might be a useful approach to explain PT information (non-)use, giving insight into the *relative* importance of the various factors studied and how they act *together*. It is stressed that the nature of the empirical evidence gathered is such that the insights we offer apply principally to information for rail travel as opposed to that for other public transport modes. The Extended Model of Goal-directed Behaviour (EMGB) (Perugini and Conner, 2000) has been expanded with external variables (such as habitual travel behaviour and trip context) to provide an integrated model of social-psychological constructs with potential constraints affecting individuals' decision making.

Preferred mode of transport (prior to consulting information) is a very important determinant of looking up PT information when planning an uncertain journey. The overwhelming majority (90%) of respondents who indicated that public transport was their preferred travel mode said they would consult PT information. Nevertheless, more than one-fifth (22%) of the respondents who indicated that the car would be their preferred travel option for their uncertain journey also said they would look up PT information – presumably with some expectation that such information could influence their prior preferences.

The results reveal that attitudes have the strongest effect on PT information use: the more positive, the more likely respondents are to look up PT information. Subjective norms and past behaviour also affect information use. Respondents who say they would be encouraged by important others to look up PT information indicate more often that they are willing to do so. Having looked up PT information for a similar journey in the past positively affects the desire to consult information. These social-psychological factors are interdependent. For example, past behaviour positively affects attitudes. These outcomes show the importance of a positive past experience with consulting PT information and the potential of word-of-mouth for the use of PT information services.

The potential constraints (or facilitators) that define the wider social context in which decisions about travel information use take place have been researched by adding external variables to the EMGB. Particularly, travel behaviour and trip context affect various social-psychological constructs (in turn affecting intention to consult PT information).

If people think it is useful to look up information, they will do so. A key question that emerges then is: when do people find it useful to consult PT information – specifically in the context of making decisions about an uncertain journey? Our findings and our previous research (Farag & Lyons, 2008b) strongly suggest that this is likely to happen when people are willing to *consider* travelling by public transport. Thus it is inappropriate in the ongoing provision of PT information services and the transport services they support to simply presume that improvements to information services themselves and increased awareness of them will lead to increased PT information use and in turn greater potential influence over travel behaviour. In practice the information services and transport services must be considered together. There must be a clear recognition that past experiences of information use, current travel behaviours and attitudes towards both information and transport options are interacting with one another and can become self-reinforcing for better or worse. Greater use of PT information will come over time from greater willingness to consider using public transport which itself will have been influenced by both past consideration of public transport and the associated PT information use experience and public transport experience. Investment is required in both public transport services alongside information services.

Acknowledgements

Table 3   **Standardized coefficients of direct and total[3] effects for the various estimated models (significance at least p < 0.01, unless indicated otherwise[4])**

Explanatory variables	EMGB	Contextual Model	Integrated Model			
Endogenous variables	*Intention*	*Intention*	*Intention*	*Attitudes*	*Subjective norms*	*Past behaviour*
EMGB constructs						
Attitudes	0.608		0.605 *0.787*		0.746 *0.746*	
Subjective norms	0.240		0.244 *0.244*			
Past behaviour	0.156		0.156 *0.469*	0.359 *0.359*	0.128 *0.396*	
Exogenous variables						
Travel behaviour						
Car use		-0.214	*-0.068*	*-0.052*	*-0.057*	-0.144 *-0.144*
Train use		0.212	*0.339*	0.141 *0.315*	*0.297*	0.485 *0.485*
Trip context						
Trip purpose is work		0.183	*0.108*	*0.100*	-0.097 *0.014*[b]	0.279 *0.279*

[3] Total effects are in *italic*

[4] [a]=significant at p < 0.05, [b]= p < 0.10, [c]=not significant

Table 3   Continued

Explanatory variables	EMGB	Contextual Model	Integrated Model			
			Outcome variables			
Exogenous variables	*Intention*	*Intention*	*Intention*	*Attitudes*	*Subjective norms*	*Past behaviour*
Travel attitudes						
Prefer car when travelling with friends		-0.184	*-0.122* [a]	-0.154 [a] *-0.154* [a]	*-0.115* [a]	
Social surrounding						
Received info service recommendation		0.109	*0.089*	0.069 *0.095*	*0.081*	0.073 *0.073*
Goodness of fit indicators						
R^2 (reduced form)	0.81	0.27	0.231	0.224	0.161	0.445
Degrees of freedom	9	4	36			
Satorra-Bentler χ^2 (p-value)	16.352 (p=0.060)	5.110 (p = 0.276)	54.693 (p=0.024)			
SRMR	0.011	0.018	0.028			
RMSEA	0.036	0.021	0.028			
90% confidence interval for RMSEA	(0.000; 0.063)	(0.000; 0.066)	(0.011; 0.043)			

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