

ASSESSING THE DEMAND FOR TRAVEL INFORMATION: DO WE REALLY WANT TO KNOW?

Glenn Lyons, Erel Avineri and Sendy Farag
Centre for Transport & Society, University of the West of England Bristol, UK

1. INTRODUCTION

1.1 Advanced traveller information systems (ATIS)

While ways of informing travellers have existed since the dawn of man itself, the information age has brought with it unprecedented new opportunity to inform travellers in the context of a multi-modal transport system that can be complex to interpret and at times unpredictable and unreliable to negotiate. Obtaining travel information can have three main purposes: it might identify further travel options that an individual was not yet aware of (e.g. in mode, route, destination), it might help an individual who has incomplete knowledge concerning the characteristics of known travel alternatives to assess these characteristics (e.g. comparing the journey time between different modes), and it might help an individual to complete a journey successfully (Chorus et al, 2006a; Lyons, 2006). The first two purposes are related to journey planning, while the latter purpose is related to journey execution.

In recent years the field of 'Advanced Traveller Information Systems' (ATIS) has been evolving. ATIS can be defined as "[t]he systematic application of information and communications technologies to the collection of travel-related data and the processing and delivery of information of value to the traveller" (McQueen et al, 2002). The mainstreaming of the Internet alongside increased computer processing power has enabled an 'ATIS supply chain' from the collection of transport system data, through data management and data processing into information, to the accessibility and use of that data by transport system users. We have witnessed the emergence of a wealth of ATIS in the marketplace – many systems (especially in relation to pre-trip information) are seen by consumers in the form of travel information websites that are now also providing associated features and services accessible via mobile devices.

1.2 The role of ATIS in tackling the policy challenges

Such developments have come at a time when transport systems around the world are subject to high levels of demand against finite supply causing problems of congestion on road networks and crowding on passenger transport. The attention of transport has been drawn to the need to make more 'intelligent' use of the available systems' capacity for the benefit of individual travellers and the system as a whole. This relates to the choices about where, when and how people travel and the routes and services that they use. It has been assumed that the lack of adequate provision of

information is a barrier to people's desire to make more fully informed choices. Accordingly the development of travel information systems and services has been spurred on by a wish to remove such barriers.

Within the UK a 1995 transport visioning exercise identified 'The Informed Traveller' as one initiative that should be taken forward in order to realise emerging technological opportunities and help promote greater public transport use. It was suggested that of importance to transport operators was the fact that "[i]gnorance of, and the lack of information about, public transport is believed to be a significant deterrent to its use especially for car owners" and meanwhile for Government, "[t]he provision of high quality information, booking and payment services improves the attractiveness of public transport, widens choice for the traveller, and makes public transport more accessible" (Technology Foresight, 1995). Not long after this exercise, the UK Government published a major White Paper setting out its 'integrated transport policy' (DETR, 1998). Key to this policy agenda included the intention to improve choice between travel modes and to provide better travel information. Such thinking and policy intention gave much impetus to the developments of ATIS and in the case of the UK over the last decade there has been the emergence of a national public transport information system, 'Traveline'¹, and a door-to-door multi-modal web-based national journey planner, 'Transport Direct'².

1.3 The presumption of inherent demand for travel information

Travel information clearly does provide benefits to the individual – as noted at the start of the paper and as attested to by the ongoing (and in several cases growing) use of ATIS. However, it is possible to detect from previous research literature and from within the evolution of the travel information industry and associated policymaking itself a rather technologically deterministic outlook. Taken to the limit there appears a view that people want to be as fully informed as possible – in possession of all the facts in order to make a rational choice as to the most attractive travel option. The only impediment to this is then seen to be the availability of information itself – something that technology can help deliver. In short it appears there has been a mentality of 'build it and they will come' in the delivery of ATIS.

This paper's interest is in examining, given the increasing availability of ATIS, to what extent there is indeed a demand for information and the factors that influence that demand. The paper is based in part upon a strategic review of travel information for the UK Department for Transport (Lyons et al, 2007) and also upon research being undertaken by the Centre for Transport & Society at UWE, Bristol in the UK on the barriers to travel information use (Farag and Lyons, 2007, 2008, n.d.).

The next section considers factors involved in people's choice making with implications for the extent to which information is needed. The following section considers more specifically the demand for information with some

empirical insights. The concluding section of the paper reflects upon what might be expected for the future in terms of the nature and extent of demand for information.

2. UNDERSTANDING CHOICE MAKING

2.1 Variation in decision making

If information is intended to support or influence choice making then an appropriate starting point is to consider the process or processes of choice making itself.

Individuals face choices every time a trip is to be undertaken – about where they are travelling to, when they are travelling, by what means and by what route. As so-called rational decision makers they wish to make the best choice by minimising the generalised cost (incorporating monetary, time and other costs) or maximising the utility³ of the journey choice(s). Rational decision making can be impeded if the individual has imperfect or incomplete knowledge about the available choices and the attributes of those choices. Thus by providing individuals with travel information they can make more fully informed choices which will be to their personal advantage (in terms of better choice outcomes and journey experiences) and potentially that of the transport system as a whole. This is one interpretation of choice making.

However, insights and (theoretical) understandings from cognitive and social psychology are now emerging through the research literature to paint a more complex picture of decision making processes. In outlining these below an important distinction first needs to be made with regard to utility maximisation. It has tended to be seen in the specific context of making one or more travel decisions. However, what the various concepts and theories below seem to suggest is that utility maximisation may instead be something which prevails at a higher level: an individual's travel decisions take place in the context of their overall lifestyle and it is for the latter that an individual is trying to achieve what they judge as the best outcome as each decision is made. Thus trade-offs are an important part of decision making.

Research in the UK, based on interviewing 406 people about a recent journey they had made, sought to expose the different decision making approaches at work when people plan journeys (SRA, 2004, 2005). Not only were eight different approaches identified, but closer examination found that for just under half of the participants, more than one decision making approach was used at different points during the planning of the journey. This one piece of research alone begins to cast doubt over any proposition that demand for travel information is derived simply from an inherent wish by all travellers to maximise the utility of their travel choice. The following sub-sections examine this further.

2.2 Effort/accuracy trade-off and satisficing behaviour

In their review of travellers' decision strategies, Chorus et al (2006b) highlighted that individuals can choose which approach to decision making they adopt based upon what they perceive to be the accuracy of their current level of knowledge about options, traded against the effort that would be involved to improve the level of accuracy (and level of knowledge).

This links to a phenomenon in the field of discrete choice theory: satisficing behaviour (Miller and Star, 1967). This is not a new theoretical phenomenon but it is now being acknowledged in more recent travel information literature (Chorus et al, 2006b; Lyons, 2006). In contrast to utility maximisation, satisficing behaviour concerns an individual being prepared to select a travel option which meets their minimum requirements (is 'good enough') even if other options exist which may be better (but which could require additional effort to identify).

2.3 Bounded rationality

A common belief is that by being more informed, travellers make better decisions. A recent review by Todd (2007) (though not specific to travel information) asks "[h]ow much information do we need?". This introduces and overviews how individuals can apply a number of short cut approaches to decision making. Todd takes the starting point of the traditional view of rational decision making "where individuals should evaluate and combine all available evidence" and where "more [relevant] information will yield better decisions". The author then looks, in contrast, at the concept of bounded rationality which considers how people can "make reasonable decisions given the constraints that they face such as limited time, limited information, and limited computational abilities". Based upon some empirical evidence it is suggested that short cut decision making that requires less information can prove to be of comparable effectiveness when considered alongside an 'unbounded rationality' approach. Two schools of thought are suggested – one is that people would wish to be unboundedly rational if only they could while the other is that people are quite content with short cut approaches that use little information and are quick to process. It is argued that if the latter holds true then trying to provide more and more information may not be a good thing.

Much of the earlier and more 'established' approaches to understand and measure travellers' responses to travel information identified the individual travellers as homo economicus - rational economic human beings who consider travel to be derived from the need or wish to be at a particular location and who try to do their best in minimising the 'cost' of getting there (including minimising risk/uncertainty). However, some of the recent studies inspired by the works of behavioural scientists provide mounting evidence (aligned with the work of Todd) that the behaviour of travellers is typified by bounded rationality - homo psychologicus. It has been argued within this literature that travellers' limited cognitive resources (gathering travel

knowledge, interpreting travel information, and processing it in real time) have a strong effect on their travel choices (Chorus, 2007; Golledge, 2002; Avineri and Prashker, 2004, 2005, 2006; Sunitiyoso et al, 2009; Avineri, 2004; Bogers et al, 2006; Chorus et al, 2006a, 2006b; Lowry and Rutherford, 2005).

Regret theory (Loomes and Sugden, 1982) is a particular aspect of bounded rationality. It concerns individuals anticipating regret if they make the 'wrong' choice. In terms of travel decisions, Chorus and colleagues (Chorus, 2007; Chorus et al, 2006a, 2006c) argue that a regret-based approach allows for capturing a traveller's choice among uncertain alternatives as well as choice-postponement through information acquisition. If the anticipated (minimum) regret is higher than an individual's threshold then an individual is assumed to postpone the decision and acquire additional information first. Chorus et al (2006a) examine how regret theory can be consistent with both satisficing and maximising choice behaviour. A maximiser will accept higher 'costs' in order to reduce the number of unknown alternatives than a satisficer, who will only do so when the known alternatives are perceived as being unsatisfactory.

2.4 Habit

There has been a growing recognition of the (apparent) prevalence of habit in travel choice making (Gärling and Gärling, 2003; Kenyon and Lyons, 2003; Lowry and Rutherford, 2005; Chorus et al, 2006b; Van der Horst, 2006). In effect habit is the preclusion of any conscious consideration of choice. Habit may not prevent information use altogether since certain confirmatory information may be consulted e.g. in relation to reliability and uncertainty (Jou and Hensher, 2005). However, it can be particularly significant in terms of mode choice - limiting the chance that an alternative transport choice is considered (Kenyon and Lyons, 2003; Van der Horst, 2006; Chorus et al, 2006c). Qualitative research by Kenyon and Lyons (2003) concerning mode choice suggests that individuals have a 'primary' mode which they habitually use for a given journey type and a 'default' mode which they revert to in situations where the primary mode is unavailable. Gärling and Gärling (2003) in their overview of the role of habit in travel behaviour do suggest that there remains a question over whether habitual behaviour involves basing decisions on past experiences or whether regular patterns of behaviour are based on using similar information each time and coming to the same decision.

2.5 The role of social interactions in information use and decision making

Travel information research has, to date, largely neglected to consider the potential significance of social interactions in terms of how travel information systems are used and thus how they are and might be designed. Through social interactions individuals are able to exchange information and influence each other's behaviour. For example, Australian users of ATIS were found to supplement their own experiences and knowledge by asking for ideas and seeking advice from friends, relatives, or workplace colleagues (Karl and

Bechervaise, 2003). Other research has revealed that people with learning disabilities find common sources of travel information difficult to use and tend to rely on word of mouth and help from other people when planning journeys (TTR, 2004).

Todd (2007) examines the concept of social learning or social imitation where an individual short-circuits their own decision making by copying the decision making of others. Research by Sunitiyoso et al (2007, 2009) used an experimental setting to examine social learning in travel decisions – people making decisions based on the behaviours or preferences of others rather than just comparing the alternatives themselves (using travel information facilities). While social effects were observed, effects were different across different groups of people. The need for further research was highlighted. These works examine the role of minority influence – where a small number of individuals with consistency in their choice making diffuse this to others.

2.6 A summary of travel decision making

Building upon the issues addressed in this section, it is possible to offer an overview depiction of travel decision making as shown in Figure 1. It is intended within the diagram that black denotes less information demand while white denotes more information demand. The elements of Figure 1 are explained as follows:

Journey - A journey can be familiar (it has been done before, the ritual of the travel experience is well known) or unfamiliar – not all journey attributes are known: knowledge is not complete. Concurrent with familiarity is predictability. A journey can be predictable – one knows what to expect; or it can be unpredictable – features of the journey such as travel duration may be prone to vary thus the individual may have imperfect knowledge.

Decision mechanism – A range of decision mechanisms or models exist: from (conceivably) complete irrationality; through those where the individual wishes to be or is forced to be expedient – a short cut decision (or boundedly rational decision) is called for; to those where the individual strives to be rational, in as full a possession of the facts as possible and making a utility maximising decision – unboundedly rational.

Decision making – Stemming from the decision mechanism(s) it may be that no conscious decision appears to be made by the individual – behaviour is habitual. The decision instead could be confirmatory – e.g. “I’m going on the train to London and just need to double check the scheduled departure time”. Alternatively, decision making could comprise assessing the available options and courses of action for journey planning.

Information source - Decision making requires that one or more information sources be consulted. This source could be the traveller herself – i.e. a reliance on past experience or instinct. The source could be significant others – other people such as friends, family or other travellers who are believed to be able to offer up their own past experience or to be able to source information for the traveller from elsewhere. Alternatively the information

source could be a formal information service (e.g. paper-based or electronic). In practice the traveller is exposed to a combination of such sources and must synthesise from a set of (possibly contradictory) signals.

Given these decision making contexts for information need, we now move to consider the demand for travel information itself.

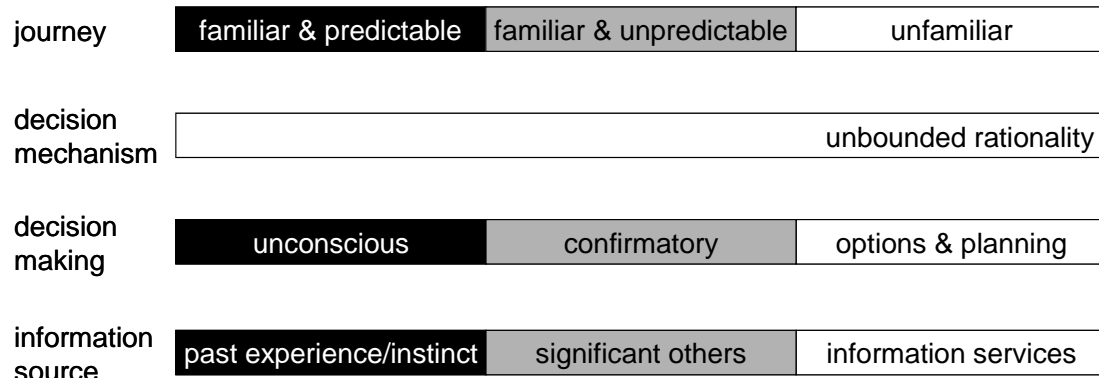


Figure 1 Travel decision making in overview

3 DEMAND FOR TRAVEL INFORMATION

3.1 Awareness of information services

One assumed prerequisite of actual use of information services is that an individual is aware of their existence (though this is questioned below). Seemingly high levels of absolute use of an information service can mask relatively poor levels of awareness in terms of percentage of the population (Lyons, 2006). For example the UK Transport Direct service had registered over 10 million user sessions by the end of its second year of formal operation and yet a national survey revealed correspondingly (as at September 2006) that only 6% of the public were aware of the service (GfK NOP, 2007)⁴. Figure 1 shows awareness levels (as at 2006) for a number of major information services in the UK – note that the figures represent prompted levels of awareness; unprompted levels of awareness are much lower. Likewise examination of data from the Puget Sound Transportation Panel in the US concluded that “a majority of the population is still unfamiliar with many of the Seattle region’s ATIS offerings” (Peirce and Lappin, 2003).

Awareness can also be at different levels – people may recognise the branding or the name of an information service but not really understand what service it provides (Atkins, 2006). Of English motorway and trunk road users it appears that one in five of those who currently do not seek pre-trip information do not know where to find this information (FDS, 2007). This could imply that awareness is a barrier to use. Indeed, awareness of public transport information (or lack of it) has been highlighted in several studies (Derek Halden Consultancy, 2006; Goulias et al, 2004) and has been identified as a

barrier to modal shift. However, awareness seems more likely to be associated with an individual's need to make use of the functions a service may have to offer – some of the insights from the previous section are likely to relate to or affect this level of need. This may explain why in an observed response survey of motorists in London passing a variable message sign displaying immediate warning information only 33% saw the sign (Chatterjee et al, 2002).

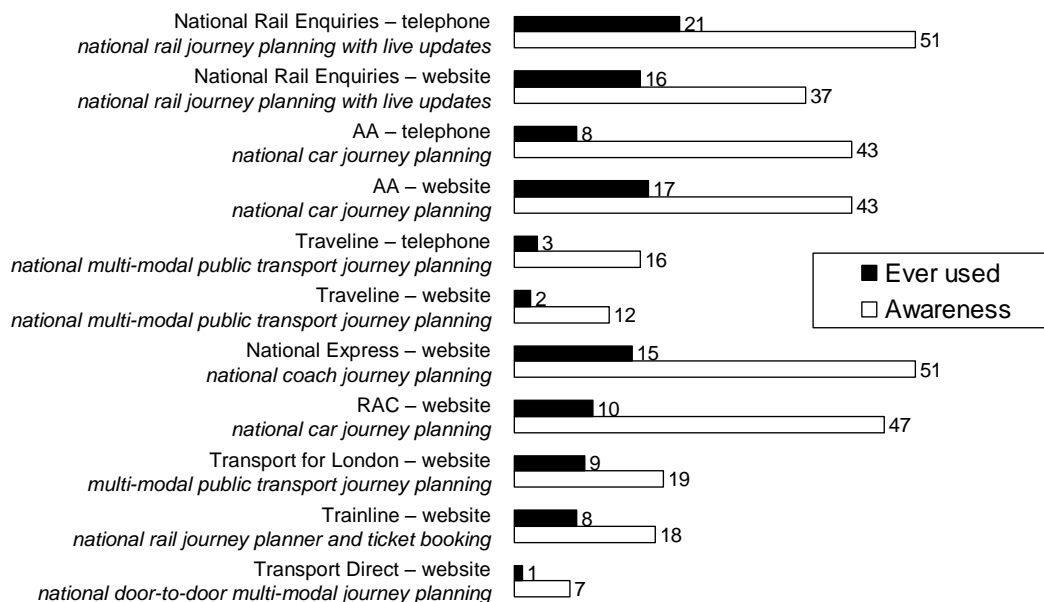


Figure 2 Prompted awareness and use of travel information services in the UK (% of respondents). Base = 2095 (reproduced from Farag and Lyons (2008) – based upon data from GfK NOP (2007))

It appears that much as people establish (satisfactory) behaviours in relation to their use of different travel modes, the same may be the case for use of different travel information sources. Qualitative research by Farag and Lyons (2008) leads the authors to suggest that people have a 'default' information source and a second option in case their first choice is not sufficient. Often a search engine is used as a starting point to finding travel information. Results to a question where respondents could give multiple answers about how they search for travel information online revealed that 64% of all responses referred to using a search engine. Half of those who use a search engine type in key words (such as "train times"), while the other half types in the name of a travel information service (such as "National Rail Enquiries"). Only 19% of all responses indicated the use of 'favourites' folders to bookmark travel websites (Farag and Lyons, ongoing research). In a review of market research evidence for Traveline, Lyons (2008) highlights that a substantial proportion of visits to the national Traveline web portal are from referrals from other websites or from search engines such as Google. Hence, specific awareness of the brand 'Traveline' was not necessarily required for enquiries to the Traveline website to be received.

3.2 Travel context

The nature of journeys people plan and undertake varies for a number of reasons – the mode(s) used, the distance and duration, the journey purpose, timing constraints and the predictability and familiarity (as noted in Figure 1). Accordingly it should come as no surprise that the demand for and use of information is influenced by travel context.

Profiling users of online traffic information in the Los Angeles and Seattle regions (Petrella and Lappin, 2004) it was found that the most frequent users are those exposed to the greatest amount of congestion and volatility in traffic conditions. Research in Seattle also notes travellers are more prone to seek information for a trip which is arrival-time sensitive or when there is a great deal of variability or uncertainty about the travel time (Peirce and Lappin, 2003). It is also found that there is considerable demand for information about what to do when things go wrong during journeys (SRA, 2005). In this respect, journey distance is not necessarily an overriding determinant of travel information need. Nevertheless, other studies do highlight a (strong) correlation between duration and (a likelihood of) drivers consulting some form of travel information (Peirce and Lappin, 2003; Atkins, 2005).

3.3 User characteristics

The literature on ATIS use mainly focuses upon socio-economic characteristics of individuals (Chorus et al, 2006b) – these being only proxies for the actual behavioural factors affecting information use. Work in the US finds that users of online traffic information are more likely to be male, between 26 and 45, highly educated, on a high income, and frequent users of information and communication technologies (Petrella and Lappin, 2004). Meanwhile a survey of users of Traveline (public transport information) in Scotland (MORI, 2006) found that users were more likely to be women, aged 25-44, employed, on a high income, and living in urban areas.

Based upon a questionnaire survey in the UK with 1327 responses, Farag and Lyons (n.d.) have applied structural equation modelling to examine various factors that may influence demand for pre-trip public transport information use. Their results show that the strongest factors related to pre-trip PT information (non-)use are travel behaviour and sociodemographics, regardless of trip type. It seems that PT information use is more about ‘the person’ than the trip. Public transport use and PT *information* use are closely connected, with travel behaviour having a stronger impact on information use than vice versa. Infrequent public transport users consult PT information less often than frequent public transport users. Also, males consult PT information less often than females, as do lowly educated persons and people without Internet access at home. Respondents who were recommended to use certain PT information services by people they know consult PT information more often than others. Unsurprisingly, respondents who find it difficult and dislike to consult PT information, do so less often. (Note that these findings

were based upon asking about 'general' views and behaviours concerning information use in relation to domestic business trips and leisure trips over 50 miles; and trips to unfamiliar destinations regardless of trip length). This work, underlining their earlier qualitative insights (Farag and Lyons, 2008), leads to a straightforward but key realisation: the effect of public transport use on public transport information use is stronger than the other way around. Thus greater demand for public transport information is more likely to be a result of people being motivated to consider public transport and then finding that information provision exists which facilitates rather than obstructs this, rather than a result of 'improving' information provision.

3.4 Levels of information use

While a range of literature examines factors influencing the demand for travel information, there is a modest amount of empirical evidence concerning the actual level of use of information.

Such evidence provides a clear message – most people most of the time do not consult travel information, because the majority of their trips are familiar, local (Peirce & Lappin, 2004; Lyons, 2006). Travel diary research in the Seattle area (Peirce and Lappin, 2003) found that some 12% of participants consulted travel information at least once (in wave 9 of the data collection) and that information was sought for 1 in 10 trips (in wave 10). The majority of reported trips were local with about 70% taking 20 minutes or less. Intercept surveys of English car drivers (Atkins, 2005) found that less than 20% of respondents had accessed information pre-trip and less than 30% en-route; and specifically considering real-time information less than 10% pre-trip and less than 20% en-route. In another survey of English drivers (FDS, 2007) it was found that the proportion of respondents ever checking road conditions before travelling is 38%. Of those respondents ever seeking pre-trip information, 45% do so every time they travel, while 34% do so if they are making a long journey and 22% do so if they are making an unfamiliar journey. The most important reasons for not seeking any pre-trip information are: 'use radio while en route' (30%) and 'can't be bothered' (29%).

While the levels of information use may appear low in percentage terms, in actual terms (given the overall levels of daily travel) a substantial amount of demand for information does exist. It is also important to recognise that 'information use' can be ambiguous in its meaning. Taken in its broadest sense it means the conscious consideration of information from any source (including word of mouth, paper-based, fixed signage, telephone, Internet and electronic signs) in the process of choosing a course of action. In some studies 'information use' is more specifically defined – e.g. the use of a telephone or Internet-based service (Accent, 2002).

4 CONCLUDING DISCUSSION

We have moved quite rapidly from a position of wishing to find ways of better informing the public about their travel decisions to now providing a multitude of information services and wishing to establish the extent to which they are playing a meaningful part in choice making and travel behaviour and behaviour change.

As pointed to at the end of the last section, one of the challenges in addressing such questions as 'how much demand for travel information is there?' is that placed in different contexts, the answers would undoubtedly be different. A more specific question could be 'how much demand is there amongst regular car users to consider public transport options for an unfamiliar long distance, time critical journey through consulting pre-trip a web-based public transport journey planner?'. This may be a helpful question to address for a given ATIS provider in their own market research. However, it rather limits an opportunity to gain a broader sense of the role of information services for the purposes of policy and public investment considerations. What then in broader terms can be said in response to this question of demand for information use? Examination of available research evidence within this paper informs and leads to a series of key assertions:

1. Individuals are not making their travel decisions in a vacuum but instead are doing so in the context of their everyday lives and competing demands upon their cognitive effort.
2. Most travel is routine – it is both familiar and sufficiently predictable so as to render behaviour largely habitual or to allow individuals to rely upon past experience to make short cut decisions to achieve satisfactory outcomes.
3. A substantial minority of journeys heighten a motivation to avoid later regret which may arise from unfamiliarity with travel options and unanticipated uncertainties with the journey itself, potentially in a context also of time criticality for reaching the destination. Included within such journeys are specific new travel environments brought about by changes in residential location, place of work etc.
4. When people do seek information, their information search may be constrained by familiarity and acquaintance with given sources of information and thus they may not be prepared to consider the different travel information service options available to them in the marketplace to establish which of these would best or most fully meet their specific needs.
5. Changes within the transport system itself (such as in the relative attractiveness of different travel modes) and the experiences of system users will likely be more influential in stimulating desire for more fully-informed choice making than changes and improvements to ATIS.

Accounting for familiarity and reliability, Lyons (2006) has suggested that demand for and importance of information into the future will be dictated significantly by two factors: the share of overall travel between familiar and unfamiliar journeys; and the extent of stability and predictability of transport

system performance. A third factor suggested is the extent of change in the relative 'costs' of alternative travel options.

It is recognised that specific information services within the ATIS marketplace can see their market share change. For example, in the UK the National Rail Enquiry Service has seen its volume of telephone enquiries decline from 52.5M in 2003/04 to 35.3M in 2005/06 while the number of visits to its journey planner website have gone up from 34.4M in 2003/04 to 46.9M in 2005/06 (ORR, 2007). However, the size of the market for information use overall may be largely out of the hands of those within the field of ATIS itself. Nevertheless, it is important that when demand does exist for information that information services are available that are easily located, are useful, and easily usable.

Figure 3 is a conceptual illustration of the distribution of all journeys being undertaken against the desire for information for a given journey.

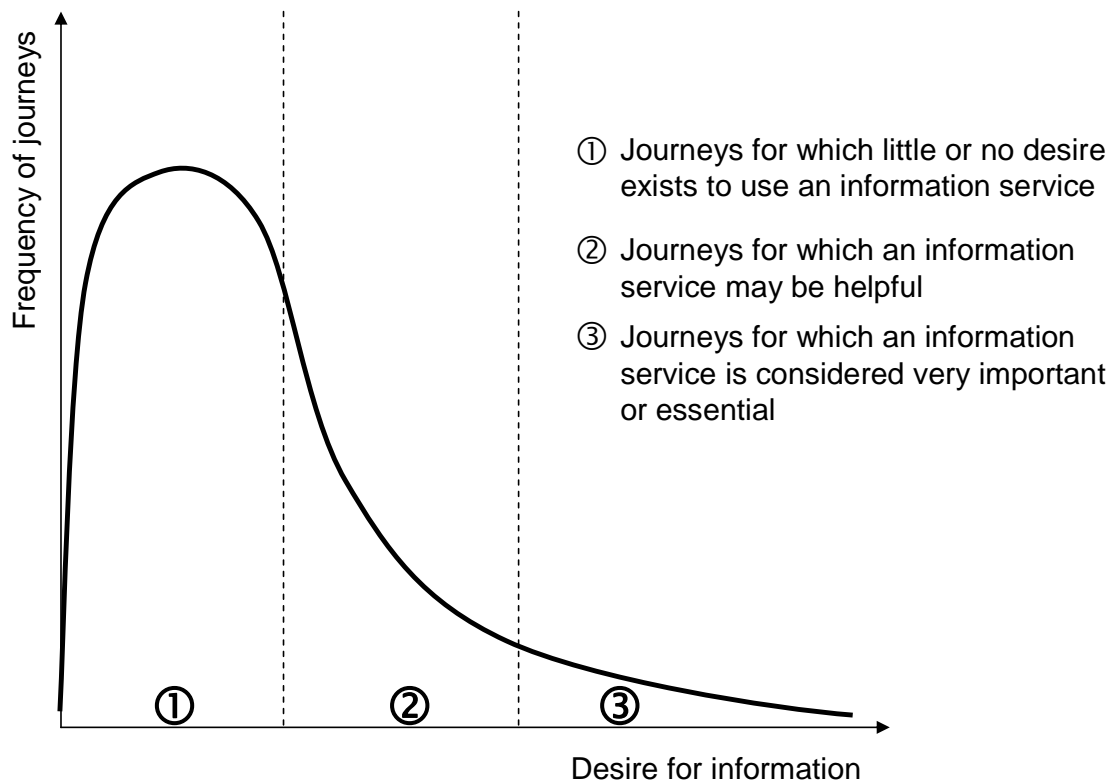


Figure 3 Illustrative distribution of all journeys against desire for information use

Notwithstanding that the distribution of journeys may itself change over time, it can be assumed that those journeys in the first part of the distribution are a 'lost cause' to the travel information marketplace. Meanwhile, those journeys in the third part of the distribution are already likely to be resulting in an almost 'saturated' use of formal information services. For both these parts of the distribution it may be suggested that an appreciation or lack of information need is largely self-evident.

However, the middle part of the distribution is a different matter. This represents those journeys for which the (perceived) value of consulting information sources is more varied. These are journeys for which the decision over whether and how much to pursue information is 'in the balance'. Within this part of the distribution are likely to reside the journeys for which further research into the understanding of demand for travel information may be most relevant. The two-fold question becomes – what proportion of all journeys is represented by this middle part of the distribution and for what proportion of journeys in this middle part of the distribution could information services be usefully consulted and yet are not? This represents the unrealised potential for the market.

The ATIS field must (continue to) acknowledge that determinants of information demand are related to the characteristics and behaviour of individuals and of the transport system. A belief that by providing simply more or more sophisticated travel information, the demand for information would increase may be misplaced. It is important to recognise that when demand for information is prompted, the available ATIS should be experienced as an enabler and not as a barrier to making travel decisions.

ACKNOWLEDGEMENTS

This paper draws strongly upon a strategic review of travel information undertaken for the UK Department for Transport and upon research investigating barriers to travel information use which is part of the FUTURES research programme funded by the Engineering and Physical Sciences Research Council. The support of both sponsors is gratefully acknowledged.

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Notes

¹ <http://www.traveline.org.uk>

² <http://www.transportdirect.info>

³ Utility is a measure of the happiness or satisfaction gained from a good or service

⁴ The adult population of Great Britain is approximately 48 million