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Measure No.17: Travel and passenger information

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Improved information for trip-makers in advance of travelling or whilst making a journey.

Information about travel options, mode and route choices as well as timetable and ticketing data can be provided by cities to help travellers find alternatives to the car. Increasingly this might be via online or phone-based resources. Operators and municipalities can also make use of 'real-time' data to inform travellers.

17.1 Context and background

This measure is primarily focussed on the provision of static (timetables, routes, prices etc.) as well as dynamic (expected arrival, delays etc.) information on public transport services to passengers.

In the past, many of these services have been provided in the form of paper timetables, or printed information at stops. This is increasingly being supported, or replaced, by electronic services – particularly those delivered via the mobile internet to smartphones.

Through providing information services, operators and cities are looking to addresses a range of issues, including improving passenger satisfaction and journey comfort, and encouraging intelligent and informed travel behaviour. In some instances, the aim is to give reliable and up to date travel information for the benefit of drivers (with the intention of minimising congestion / pollution, or optimising parking). Travel information may arguably also be used to encourage modal shift, in particular through multi-modal information which allows travellers to construct complete (end-to-end) journeys across a range of modes.

Key messages:

- The provision of travel information (especially real-time), is desired by travellers.
- Access to travel information can be most valuable to users when uncertainty is highest (e.g. for buses more than trains, and for more congested cities).
- The economic implications of information provision were generally viewed positively, although not quantified rigorously.
- Some passengers would be willing to pay a higher price for bus services that included real-time information.
- Deploying travel information via the internet can be less expensive than options such as public screens, and can benefit users before they reach a stop or station.
- It is inconclusive as to what extent provision of information on its own may affect patronage or potentially modal shift.
- Moves to deploy more information via the (mobile) web may exclude those who cannot access the technology (i.e. smartphones).
- Reducing perceived waiting time with real-time information would be less expensive than increasing public transport frequency.

Potential interventions

- Travel information (timetables and journey planning), online and on mobile devices.
- Real-time information (RTI) on public transport services, online on mobile devices and at bus stops / railway stations / public locations (for example shopping malls).

Some studies consulted for this review investigate RTI for public transport. This information can be conveyed to the user via at-stop or on-board displays or via web-based and phone technologies (including telephone calls, texts or apps.) It can also be conveyed via touch screens although this method is not covered in this review. The review also examines websites that provide multi-modal travel information. Some of this information is based on real-time data, some is static (based on bus timetables for instance). Most of the interventions reviewed here provided information for public transport users only. Two multi-modal websites that also include information for car drivers were exceptions to this.

17.2 Extent and Sources of Evidence

This review considers eleven items of evidence, mostly academic journal articles, but also three reports and one conference paper. Two of the reports are for the EU CIVITAS project, the other was a European commission report for the Trans-3 project. Items that review specific interventions were available for this study, so that the inclusion of meta-studies or literature review articles as items has not been necessary.

One item refers to on-board screens on buses, three relate to at-stop/station RTI screens, and others to web / phone based RTI provision. Another source compares at-stop displays and phone based provision whilst others refer to multimodal travel information websites. In terms of scale, the interventions generally cover a city or part of a city. One of the website interventions covers a region.

Five of the items reviewed were published in the last 5 years and report on recent interventions, suggesting that research and development in this field is ongoing. It is likely that the advancement of smartphones and other technologies will ensure the topic receives ongoing attention. Many of the items related to apps and other up to date media. However some relate to technologies that may now be slightly out of date. The CIVITAS (2) report from Aalborg suggests that keeping up with technological development was difficult whilst developing a travel website. Caulfied & O'Mahony (2009) studied methods for receiving RTI (SMS and telephone call centre) that are arguably already out of date, for some users, due to the development of smartphones.

17.3 What the Evidence Claims

17.3.1 Real-time information (RTI)

Lehtonen & Kulmala (2002) investigated user satisfaction and behaviour in relation to the provision of electronic displays showing RTI at 15 bus or tram stops in Helsinki, Finland. The study found that generally the passengers found the displays useful (66% of tram users and 78% of bus users), understandable and easy to notice. Some (13% of tram users and 20% of bus users) also reported using public transport more as a result of the displays. Due to this success, Helsinki city transport decided to further extend the deployment of at-stop displays.

Caulfield & O'Mahony (2009) assessed the relative popularity of receiving RTI from at-stop displays, and by phone (SMS or ringing a call centre). They found that riders preferred to get the information from at-stop displays.

A number of the studies focused on passenger satisfaction with the information provision. Politis et al. (2010) found that 83% of those interviewed were satisfied with the RTI provided by at-stop displays and 94% were satisfied with its reliability. RTI displays can also be housed on public transport vehicles. (CIVITAS 1) reports on the addition of on-board monitors giving information about upcoming stops and RTI about routes passengers might want to connect with on disembarking. They found 88% of respondents liked the displays, 87% liked the news and weather information that the screens also displayed and 90% thought them an improvement to the service.

Increasingly, RTI has become available through the (mobile) internet and phone devices of the individual traveller. Watkins et al. (2011) investigated bus information provided through website, telephone, text and apps. They suggest that web or

phone based provision has an advantage over at-stop displays, in that it can advise on bus times before the user has reached the stop, thus minimising their wait at the stop. Tang & Thakuriah (2012) examined longitudinal data which suggested that the roll out of RTI (received through web or smartphone) across most bus routes in Chicago led to slight increases in bus patronage. Brakewood et al. (2014) also examined the effect of provision of RTI for bus, via website and mobile apps. Their study found that satisfaction with the length of wait for, and with the punctuality of, buses improved after the introduction of such information provision.

The studies reviewed here highlight two major benefits concerning RTI for public transport users. These are the reduction of the frustration surrounding uncertainty about arrival and departure times, and the reduction of actual and perceived waiting times. With regard to reducing frustration, Caulfield and O'Mahony (2009) collected findings in their questionnaire that identify some of the problems that RTI can ameliorate: They found 80% of all users were frustrated by uncertain arrival times of public transport vehicles, 69% were frustrated by not knowing if their desired vehicle had departed and 70% were frustrated by not knowing departure times. Brakewood et al. (2014) found that the frustration and anxiety that bus users had felt previously was reduced by the availability of RTI.

The evidence suggests a second major benefit of RTI for public transport users is that it can reduce their actual and perceived waiting time. This is important as delays that occur before the arrival of the vehicle that have the most damaging effect on public transport passenger satisfaction. Thus the main benefit of reducing actual and perceived waiting time is that it can improve the journey experience for the public transport user. With regard to actual waiting time: Watkins et al. (2011) found decreases of around 2 minutes, whilst Brakewood et al. (2014) found that RTI led to a decrease of actual waiting times of 1.5 minutes on average.

In addition to reducing actual wait time RTI appears to also reduce the perceived wait: Dziekan & Kottenhoff (2007) found at-stop information lead to a decreased perceived waiting time of 20%. Watkins et al. (2011) found that bus riders who were not provided with RTI perceived their wait to be longer than it actually was, whereas those who have such information did not. Those bus riders without RTI perceived their wait time to average 9.9 minutes, for those with it the figure was 7.4 minutes (a reduction of about 30%) (Watkins et al. 2011).

17.3.2 Multi-modal websites

Enei (2014) examined two regional level travel information websites in Italy, providing timetable and other static information on bus and rail services. The study assumed that the websites would lead to 5% modal shift. The resulting positive economic and other effects of this shift are outlined in the study.

(CIVITAS 2) reported on improvements to two transport information websites covering the city of Aalborg. Coverage comparing modes was improved and flow information and option of personalising site pages were added.

Rapp (2003) reported on a website covering Basel that sought to inform the modal choice of trip makers with route planning, estimation of travel time etc. It was a multimodal site covering car, bike, park and ride and other modes. It took account of real-time parking and driving conditions. 70% of visitors to the site gave it a positive rating and 85% thought it useful.

17.3.3 Modal shift

A question that emerges from the above studies is whether the provision of real-time information can lead to modal shift. There was a variety of conclusions drawn on this, with some studies suggesting modal shift can result. Lethtonen et al. (2002) report that their findings suggest that displays at stops/stations might affect modal shift and lead to increased numbers of trips on services. Enei (2014) bases his analysis of the benefits of a travel information website on the assumption, taken from literature, that the website would be likely to create a 5% shift from car to public transport. Enei concludes that travel infor-

mation sites can support other policy objectives, such as achieving modal shift. As described above Tang & Thakuriah (2012) found that real-time information provision led to modest increased in bus patronage. By contrast, (CIVITAS 2) found no detectable modal shift resulting from the travel websites reported on. However they suggest these findings were complicated by the economic crises. The study concludes that information does not, on its own, change travel behaviour, but that it can play a supporting role in reaching of intelligent modal decisions by trip makers, if they are forced into changing mode by factors such as extreme congestion. In conclusion on this question the achievement of modal shift through information provision appears a credible possibility. The usefulness of such provision in supporting other efforts to achieve modal shift seems more certain.

A final question regarding the evidence reviewed is whether real-time information might create a greater improvement for some modes than for others. Caulfield and O'Mahony (2009) found that rail users were less frustrated by uncertainty than bus users. As frustration increases, real-time information becomes more valued, suggesting that bus users would find more value from the additional information than rail users.

17.3.4 Economic benefits

The economic implications of information provision were generally viewed positively by the studies. Dziekan & Kottenhoff (2007) suggest reducing perceived waiting time through RTI would cost only a fifth of the resources needed to increase the tram service studied itself (see also Watkins et al. 2011). Tang & Thakuriah (2012) suggest that due to increasing connectivity, the benefits of RTI may outweigh the costs. Politis et al. (2010) found that some passengers would be willing to pay a higher price for bus services that included real-time information. Caulfield & O'Mahony reached the same conclusion through their stated preference survey. On this basis Politis et al. (2010) calculated that if 30% of passengers were willing to pay 0.65€ rather than 0.50€, the costs of the investment for the information provision would be regained in less than a year. The study also concluded that the annual economic benefits of the provision would be twice the investment cost.

Evidence pointed to the fact that the cost of providing RTI can vary significantly according to the media through which it is communicated. For example, Watkins et al. (2011) consider that information provision through websites and apps is much cheaper than at-stop or on-board displays. However CIVITAS (1) suggests that even on-board displays did not lead to the local authority increasing operating costs, although there may have been some extra costs for the contractor. Whilst it is likely that provision through web and smartphone would be cheaper than at-stop displays, this may lead a 'digital divide', with those who cannot afford a smartphone and/or mobile internet access, and who may depend on public transport, being unable to reach the information. Similar issues may also arise in respect of the ability to use these devices in segments of the population most likely to be reliant on public transport, such as the elderly.

Several studies looked to quantify increased patronage as a consequence of improved information systems, for instance does RTI provision lead to more people taking the bus? Tang & Thakuriah (2012) addressed this issue, but could only use overall bus ridership levels that, as they concede and attempted to control for, could be affected by a large number of internal and external factors, (weather, economic climate etc.). As a consequence, they could not answer questions about who had started using the bus due to information provision and why. Brakewood et al. (2014) also attempted to address the same issue, using an experimental design. Here it was found that bus riders in Tampa tended to depend on the mode and had no alternatives (with around 56% not having a driving license). This could explain perhaps the findings that the improved experience from RTI provision failed to lead to increased patronage in their experimental group.

Notably, Enei (2014) stands out amongst the studies reviewed as being the most focused on economic costs and benefits. Ex-

amining the potential economic effects of regional travel information in Italy, including environmental savings, accident savings, air pollution savings etc. he concluded that the websites would lead to savings in external costs of about €18 million annually. However, this figure was based on the assumption that the websites would lead to a 5% modal shift, an assumption that was based on other literature rather than primary data. A final economic factor to mention in relation to the studies is that some of the findings were complicated by the impacts of the economic crises (CIVITAS 1, CIVITAS 2).

17.3.5 Nature of methods

Four studies sought to gain data about at-stop or on-board screens:

Lehtonen & Kulmala (2002) conducted before and after surveys to assess customer attitudes to the introduction of at-stop real-time displays. The after surveys were conducted roughly 6 months after the improved bus and tram services had begun operating. Similarly CIVITAS (1) conducted surveys to measure 'acceptance' levels of on-board real-time information screens, before and after their implementation.

Dziekan & Kottenhoff (2007) comment on two case studies. For the first, in The Hague, they asked tram users about their perceived waiting time before and after the introduction of at-stop real-time information. There was also an observational study in Sweden, observing the percentages of people running in subway stations according to whether displays showing the timing of the next train were switched on or off.

Politis et al. (2010) used a system similar to a willingness to pay measure. They asked passengers the proportion of the fare price that they considered paid for real-time information provision, and their satisfaction regarding the service.

Some studies examined the effects of web and phone based information on public transport users:

Watkins et al. (2011) compared bus users with RTI on their smartphones with those who did not have it. Watkins et al. achieved this by asking people waiting at bus stops for their perceived wait time and also by observing their actual wait time.

Tang & Thakuriah (2012) used longitudinal data spanning an 8 year period, during the roll out of bus RTI across Chicago. They controlled for a number of internal and external factors to examine the effect that real-time information had on patronage. This methodology is different to the others in investigating overall ridership levels of buses rather than user satisfaction.

Brakewood et al. (2014) conducted a before and after behavioural experiment into the provision of real-time information by website and app. This included experimental and control groups. Real time was only given to the experimental group. The 'after' data were gathered about three months after real time information had been introduced to the experimental group.

Caulfield & O'Mahony's (2009) study differed to the others by recording neither actual travel behaviour nor actual customer satisfaction. Instead they conducted a stated preference survey in which respondents were asked to choose between three ways of accessing real-time public transport information. The importance of the benefits of these ways was measured by stated preference in relation to increases in fares and reductions in waiting time. A number of factors that can influence an individual's willingness to pay for real-time information were also examined. The methods employed by the studies examining general travel information websites will be discussed under the next heading.
The studies have a wide variety of sample sizes, many of which were appropriate. As examples of the variety, Lehtonen & Kulmula (2002) surveyed 412 tram passengers and 528 bus passengers, Brakewood et al. (2014) used a sample of 268 with 110 in the experimental group and Enei (2014) used data reporting 37,000 hits to a website.

The studies used a variety of statistical tests including simple descriptive statistics (Lehtonen & Kulmula, 2002, Dziekan & Kottenhoff, 2007, CIVITAS 1, Rapp,

2003) linear mixed effects model (Tang & Thakuriah, 2012) and a nested logit model structure (Caulfield & O'Mahony, 2009).

In conclusion a wide range of methodologies and methods were used. The methods chosen were generally suitable to the studies' aims. Most of the studies were aimed at investigating different aspects of user satisfaction and perceptions rather than users' travel behaviour. A particular perception of interest was that of waiting time at stops.

17.3.6 Strengths / weaknesses in the methodologies

All of the studies reviewed can be considered to provide high quality evidence, with some caveats. The 11 items reviewed have good quality methodologies, and the varying methodologies used across the studies complement each other. In general it can be assumed that the questionnaires and other methods used captured real world attitudes. It is also likely that most of the projects achieved findings that would have been replicated, had the research been repeated with the same methodology and population.

Some studies used particularly effective and comprehensive ways of achieving comparisons between information provision and non-provision. For example Tang & Thakuriah (2012) compared bus routes that had real-time information added both to other routes that did not have information and also to those same routes, previous to receiving it. Watkins et al. (2011) used teams of two researchers, one asked those waiting for buses for their perceived waiting time, the other observed their actual waiting time. A similarly impressive methodology was employed by Brakewood et al. (2014) who used both before and after data as well as experimental and control groups.

A key indicator used for the studies investigating the success of traveller information websites was the ongoing numbers of hits the websites received (Enei 2014, CIVITAS 2, Rapp, 2003). The success of the websites was also measured by surveys into awareness of the site (CIVITAS 2) and questionnaires investigating user appraisal (RAPP, 2003). Researching websites has the advantage that the way in which the user has used the site, for instance the trip origin and destination they have entered, can be recorded (Enei, 2014). As Enei concedes this obviously does not correlate perfectly to actual behaviour, a user can enter an origin and destination for a potential bus journey but then not make that journey in real life.

There were also some weaknesses in some of the methodologies reviewed. These included that not all the studies included before and after studies. In addition, some of the studies had some minor biases in their samples. For instance Lehtonen & Kulmala (2002) report that females were overrepresented in their study and Brakewood et al. (2014) state that their sample group under-represented bus users of a lower income, respondents without car, African American users and those under 18. Caulfield & O'Mahony (2009) report their sample of office workers was not representative of the whole Dublin population.

Another study, (Politis et al., 2010) used a measure similar to willingness to pay that can in some aspects be misleading. For example they suggest their finding that people made 34% extra bus journeys because of the information was likely to be unrealistic, and reflected a general positivity about the information provision. Brakewood et al. (2014) raise the possibility that some of their results may have been influenced by affirmation bias: the motivation for the respondent to write the response desired by the researcher. It is easy for the passenger respondent to indicate in satisfaction surveys that they value real-time information, they might do so both because of affirmation bias and in order to encourage a more widespread provision of real-time information in their city.

It could be argued that different responses would be gained if respondents had to prioritise such information against other improvements or added expense. For instance passengers surveyed by Lehtonen & Kulmala (2002) suggested they would support RTI being more widespread on the bus network but not if some bus routes had to be sacrificed in order to fund the improvements. However, counter to this

objection, Politis et al. (2010) found that males valued the provision of information at 22.2% of their bus fare and females at 26%. They thus conclude if real-time information provision was paid for by an increase of fare of 5-10%, this would not significantly decrease patronage.

17.4 Lessons for Successful Deployment of this measure

The range of case studies illustrated here gives confidence that implementation of similar schemes in other cities are feasible, and that benefits are transferable. The case studies use a range of methodologies and highlight technologies like bus stop displays and smartphone apps, which could be applied in all European cities. One element of travel information that might vary from country to country and which might introduce an extra element of complexity is the number of languages in which the information is provided. For instance travel websites in Basel had to include 3 languages (Rapp, 2003).

Provision of travel information is seen to be particularly helpful where and when road conditions are unpredictable. For example (CIVITAS 2) suggests that congestion in the city of Aalborg is not too bad under usual conditions and traffic conditions are fairly reliable. Hence the use of a travel information website was not as high as it might be in cities with more congestion. Extreme weather may be another source of unpredictability which again favours the deployment of information / RTI. The evidence suggests that under such conditions use of travel information websites can increase significantly (CIVITAS 2, Enie, 2014). More specifically, the CIVITAS 2 report proposes that the dramatic increase in people accessing the travel websites in that study during a period of extreme weather, showed that people were aware of the web-based information, and knew that they could access it when they needed it.

Effective marketing was seen as important to maximising information use by a number of the studies here, making the public transport user aware of the information that is available, as well as informing non users of public transport of services available – which can become more relevant perhaps in situations of disruption / extreme weather.

Information provision needs to be accessible and understandable for the user. For example, CIVITAS (1) comment that onboard display screens had to be timed so that everybody could read the information before the screen changed and Brakewood et al. (2014) found that some of their participants found smartphone apps hard to access. Consideration needs to be given to the technology used (for passengers and for operators), and it is recommended in the CIVITAS (1) report that a flexible system that can adapt to IT advances and trends is used. They also suggest making the RTI data available to private companies who can disseminate it – this can also reduce costs for an operator / city. Consideration also needs to be given to the cooperation that might be needed between different technology suppliers in order for systems to work effectively.

17.5 Additional benefits

As well as the evidence of economic and financial benefits of interventions discussed above, there are a number of additional benefits that are claimed for these policies:

- Modal shift: Some studies suggest that provision of travel information can help encourage modal shift, with one forecast suggesting 5% shift from car to public transport. This would lead to accident and air quality benefits. Reports from actual interventions indicate a much more modest effect.
- Improved passenger satisfaction: The evidence suggests a second major benefit of real-time information for public transport users is that it can reduce their actual and perceived waiting time. This is important as delays that occur before the arrival of the vehicle have the most damaging effect on public transport passenger satisfaction.

17.6 Summary

There is strong evidence in the studies reviewed that the provision of travel information, especially real-time information, is desired by trip-makers and can improve

satisfaction with journeys. Providing real-time information is a good way to improve the experience of public transport users. It can achieve this both by removing frustration surrounding uncertain arrival and departure times, and by reducing actual and perceived waiting times at stops. An important decision to reach is whether information provision will be via public screens or web and phone. As discussed above, the latter may be cheaper, and can benefit the rider even before they reach the stop or station, but may exclude those, for instance, who cannot afford smartphones. A theme in this review is that travel information can be most valuable to the user when uncertainty is highest. Examples given include that information may be more valued for bus services than rail if the former are perceived as more unreliable. It may also be more valued in cities where congestion is heavy and unpredictable and when extreme weather occurs.

Most of the studies suggest that in terms of improving user satisfaction, travel information, including real-time information can be significant in its own right, without necessarily being part of a package of other measures.

As discussed above it is inconclusive from the studies reviewed to what extent provision of information, as a solitary measure, may affect modal shift. There were a variety of conclusions on this, a greater number of studies suggested modal shift does result than does not. The likelihood of achieving, or the degree of, modal shift is increased if the measure is introduced as part of a package of measures that might for example also include improved bus priority, (Lehtonen & Kulmala, 2002) fare prices (Politis et al., 2010) or increased quality of service (Tang & Thakuriah, 2012).

The PESTLE analysis conducted suggests that information provision can be positive economically and that whilst there can be issues surrounding changing technology, these were overcome, in the interventions studied.

For two reasons there can be a good level of confidence about the evidence reviewed. Firstly most of the items refer to a specific intervention and draw on specific and primary data. Secondly there is a good range of data collection methods, spanning from before and after studies with control groups, to stated preference and from observational research to longitudinal data collection.

A gap in evidence remains regarding the degree to which improved information can lead to new users opting for public transport use. In addition, more information about the economic benefits and costs of information provision needs to be gleaned. As Tang & Thakuriah (2012) demonstrate the influence of information provision on ridership levels is hard to isolate accurately

17.7 References for this Review

Brakewood, C., Barbeau, S. & Watkins, K. (2014). An experiment evaluating the impacts of real-time transit information on bus riders in Tampa, Florida. Transportation Research Part A: Policy and Practice, 69, 409-422.

Caulfield, B. & O'Mahony, M. (2009) A stated preference analysis of real-time public transit stop information. Journal of Public Transportation, 12(3), 1-20.

CIVITAS (1)(date unknown) On-trip Bus traveller information in Aalborg. Archimedes project. Measure number 69. [online] http://www.civitas.eu/sites/default/files/evaluation_on-board_bus_travel_information.pdf accessed [14/04/2015]

CIVITAS (2)(date unknown – approximately 2012) Modernising Travel information in Aalborg. Archimedes project. Measure number 09 [online] http://www.civitas.eu/sites/default/files/evaluation_modernising_travel_information.pdf accessed [14/04/2015]

Dziekan, K., Kottenhoff, K. (2007) Dynamic at-stop real-time information displays for public transport: effects on customers. Transportation Research Part A: Policy and Practice, 41, 489-501

Enei, R. (2014) The assessment of social benefits of two Marche region of Italy multimodal traveller information systems. In: Transport Research Arena (TRA) 5th Conference: Transport solutions from research to deployment. Paris, 14-17 April 2014.

Lehtonen, M., Kulmala, R. (2002) Benefits of pilot implementation of public transport signal priorities and real-time passenger information. Transportation Research Record: Journal of the Transportation Research Board, 1799(1), 18-25

Politis, I., Papaioannou, P., Basbas, S. & Dimitriadis, N. (2010) Evaluation of a bus passenger information system from the users' point of view in the city of Thessaloniki, Greece. Research in Transportation Economics, 29, (1) 249-255

Rapp, P. (2003) Trans 3. Multimodal travel information service for trinational regional transport. Project no. IST-1999-20385. Final report. European Commision's Directorate General for Mobility and Transport [Online] http://www.transport-research.info/web/projects/project_details.cfm?id=36778 [Accessed 16/04/2015]

Tang L. & Thakuriah, P. (2012) Ridership effects of real-time bus information system: A case study in the city of Chicago. Transportation Research part C: Emerging technologies, 22, 146-161

Watkins, K., Ferris, B., Borning, A. Scott Rutherford, G. & Layton, D. (2011) Where is my bus? Impact of mobile real-time information on the perceived and actual wait time of transit riders. Transportation Research Part A: Policy and practice, 45, 839-848

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