

IMPACT ASSESSMENT OF TRAVEL BEHAVIOR CHANGE PROGRAM: A CASE STUDY OF LIGHT RAIL SERVICE IN CAGLIARI, ITALY

Benedetta Sanjust - University of Cagliari - CRiMM - b.sanjust@unica.it

Italo Meloni - University of Cagliari - CRiMM - imeloni@unica.it

Erika Spissu - University of Cagliari - CRiMM - espissu@unica.it

ABSTRACT

This paper describes the experimental design of a Voluntary Travel Behaviour Change program (VTBC) implemented in Cagliari (Italy), for promoting a Light Rail service. More specifically the results from two different types of VTBC techniques, (1) *Personalized Travel Planning* (PTP) and (2) *Public Transport Information and Marketing* (PTIM), are compared in order to evaluate their different impact on travel behavioural change. PTPs offer personalized and customized travel solutions devised on the basis of the observed travel behaviour of individuals, to encourage them to travel more sustainably, while PTIMs use more general information to promote transit use through advertising campaigns. Results seem to have important policy implications. Indeed, they indicate that providing car users with tailored travel solutions (PTP) have a greater positive effect on behavioural change, compared to the mass communication approach (PTIM).

Keywords: Soft measures, VTBC, Personalized travel Plan, Public Transport Information and Marketing

1. INTRODUCTION

Individual travel choices are strongly interwoven with the social practices of everyday life. Further, the majority of trips for conducting daily activities are made by car, the pivot around which people organize their daily routine. Changing this routine, in an attempt to improve travel choice, both in terms of environmental performance and quality of life, demands a greater effort than most people are prepared to make.

Car use behaviour is in fact activated in an automatic fashion, in other words a poorly deliberate and conscious decision, as the choice has already been made in a past experience. As explained by Kahneman (2011), the cognitive processes underlying daily

travel behaviour can be classed as “fast thinking” and automatic. These processes, though voluntarily controlled, usually proceed on automatic pilot (car use, route travelled, etc.). Furthermore, the habit of using the car is also reinforced by the fact that drivers are often uninformed or unaware of the existence of alternative travel modes (Gardner and Abraham, 2008). For instance a habitual driver will most likely not even contemplate public transport as an alternative means of getting from one place to another (Verplanken *et al.*, 1998). Indeed, the more frequently a trip is made, the less likely will an individual feel the need to obtain other information. When making decisions about travel, individuals tend to prefer the information on hand about the alternative rather than making an effort to find better solutions, by procuring more information. This is associated with satisfying behaviour that arises when an individual judges the alternative he uses as fairly acceptable. Although, there may exist better options that require an effort to be identified (ESRC, 2008).

In all these situations people need to be assisted to make better judgments and better decisions, and in some cases policy and institutions can provide that help, in an uncoerced manner (Kahneman, 2011). In some cases, like for instance unawareness or lack of information about the alternatives, individuals have no inkling they are overusing their cars. In everyday life, constant attention is not practical (Kahneman 2011). One cannot question every routine choice made, and in many cases as Kahneman puts it “slow thinking would be too slow to replace fast thinking”.

It has been demonstrated that though many people are willing to reduce personal car use, in practice are unable to do so on their own (Ampt, 2003). Thus, strategies and measures are required to encourage people to rethink their travel choices. A behavioural policy should improve information and awareness, reinforce certain arguments and put forward suggestions, with a view to heightening people’s awareness of the effects of their behaviour and of behaviour change. In this sense, coercive measures for reducing traffic through disincentives (road pricing, restricted traffic areas, etc.) can temporarily solve the problem, but once the measures are lifted the problem reemerges. Measures for promoting good choices that persist through time need to encourage people to decide voluntarily without restricting their freedom. These “soft” measures are coherent with Thaler and Sustein’s nudge theory (Thaler and Sustein, 2008). They claim that institutions can implement measures to drive people into taking decisions that benefit their own interests, even though this demands greater reflection, commitment and responsibility on their part.

The present paper describes an experimental program conducted in Cagliari (Italy), between 2011 and 2012. The program aimed at promoting a light rail service among car users travelling daily along the same corridor. It can be regarded as a pilot test of a Voluntary Travel Behaviour Change program (VTBC) that will soon be extended to the entire set of sustainable alternatives existing in the urban area. In particular, the program described in this work comprises a series of measures implemented through time to encourage and assist people to reconsider their own travel behaviour, not only for themselves but for society as a whole.

The analysis conducted in this work investigates in particular the impact of different information provision (i.e. personalized information versus generalized information) on individual travel behavioural change.

The rest of the paper is organized as follows. The next section briefly describes how behavioural change is addressed in the literature, focusing in particular on the approaches

used in transportation research and the contribution of the current study. Section 3 describes the methodology employed. Finally, Section 4 contains the results, conclusions and further research opportunities.

2. LITERATURE REVIEW

A number of policies have been implemented by Governments to encourage behavioural change among existing alternatives. Social marketing is often used to involve the community in behavioural change programs, in particular to achieve major social objectives regarding health (Gardner and Stern, 1996) and the environment (Defra, 2008). In the transportation sector, behavioural change programs have been applied through the Travel Demand Management (TDM, also referred to as Mobility Management, Cairns *et al.*, 2008), and further through the so called soft measures (Bamberg *et al.*, 2011) also called Voluntary Behavioural Change Programs (VTBC) (Ampt, 2003). The latter are based on social marketing techniques and information campaigns to motivate, support and encourage behavioural change (see Figure 1).

Soft measures are policy interventions aimed at intervening directly in individual decision making processes (Bamberg *et al.*, 2011). As opposed to the so-called hard measures that attempt to modify people's travel choices as an indirect effect of taxes and fees (i.e. road pricing, parking fees, *etc.*), soft measures lead people to reconsider their mobility styles, encouraging them to strike a balance between different modes of transport (Bamberg *et al.*, 2011). The basic concept is that information and awareness rising about the effects of car use on personal and societal well-being is essential for promoting travel behaviour change. Under various names and forms VTBC have been implemented mainly at a personal level (personalised communication) and community level (mass communication), in different countries, especially in Australia, UK, Japan, Germany, and Austria among others (Ritcher *et al.*, 2011).

Mass communication programs are also called *Travel Awareness Campaigns* (Jones and Sloman, 2003) and *Public Transport Information and Marketing* (PTIM) (Cairns *et al.*, 2004). The objective of travel awareness campaigns is to heighten individual awareness of travel choice effects on the environment and on health.

Generally speaking, Public Transport Information and Marketing (PTIM) are measures aimed to encourage the use of public transport. The objective of these campaigns is to attract new customers and usually they are implemented by public transport agencies together with local authorities, especially when introducing improvements to the service (new lines, new vehicles, *etc.*); they may be accompanied by temporary price promotions, offering a trial period for free or at a heavily discounted fare, in order to attract attention (Thøgersen, 2009; Gould and Zhou, 2010).

These advertising campaigns usually provide general information about services, schedules, fares. Although most campaigns use segmentation to target measures towards appropriate sections of the target audience (Davies, 2012), they do not provide information about personal travel behaviour.

The various mechanisms by which changes in the provision of information and the level of motivation might bring about changes in attitudes and behaviour have been examined in two research projects funded by the European Commission: INPHORMM (1998) (INformation and Publicity Helping the Objective of Reducing Motorised Mobility) and its successor TAPESTRY (2003) (Travel Awareness, Publicity and Education supporting a Sustainable Transport Strategy in Europe).

As opposed to mass communication, various programs defined as Personalized Travel Planning (PTP) aim to provide individuals with travel-related information based specifically on their observed daily activity-travel needs. The importance of using a personalized approach lies in recognizing the potential for greater efficacy in travel behaviour change with respect to mass communication, because this type of communication cannot be easily disregarded by the car-user (Garling and Fujii, 2009). Further, since most of the personalized approaches are based on observing the travel behaviour of each individual/household involved in the measure (before and after the implementation), PTPs often provide a customized feedback for the proposed behaviour change.

Some examples of PTP are Travel Feedback Programs (Fujii and Taniguchi, 2006), IndiMark and Travelsmart (Brög *et al.*, 2009), Personal Journey Plans (Halden, 2008), and Travel Blending (Ampt, 2003).

Travel Blending (Rose and Ampt, 2001; Taylor and Ampt, 2003), implemented by SDG, represents one of the most "personalized" approach implemented in terms of observing behaviour, creating personalized travel plan, and providing feedback.

Travel Blending can be incorporated into PTP programs that analyze the daily car use behaviour of a target group and offers a set of personalized suggestions on how to combine different travel modes and reduce private car use. The program involves two steps (before and after), which utilize four kits. In the first step the participants record their daily travel in a 7-day activity-travel diary (kit n.1), including trip purpose, mode and destination; distance travelled was measured by car odometers. During the following weeks the travel information is analyzed and a quantitative feedback based on personal weekly car use, trip duration, kilometres travelled per mode and CO₂ emitted is provided (kit n.2). The second step, implemented four weeks after the first, consists in delivering a new 7-day diary (kit n.3) to be filled in by the participants. At the end of the week the completed diary is examined and on the basis of the information contained, a quantitative-comparative feedback is prepared between the behaviour observed in the first and second step after receiving suggestions for travel "blending" (kit n.4). In this program the quantitative feedback is a key element, as many individuals are unable to quantify the effects deriving from their behaviour. However, the feedback provides the participants with tangible evidence of this (Rose and Ampt, 2001).

In short, in those cases where the information is expressed at a more general level it is usually described as PTIM approach, whereas when aimed at specific personal conditions and individual journeys it resembles the PTP approach more closely (Moser and Bamberg, 2011).

The Voluntary Travel Behaviour Program presented in this work, describes the impact of *Public Transport Information and Marketing* (PTIM) vs. *Personalized Travel Planning* (PTP).

Data used is drawn from a VTBC program implemented in Cagliari (Italy), which included: (1) a broad promotional campaign of a new Light Rail Transit (LRT) service among car users (PTIM), (2) the submission of personalized travel information to a sub-set of car users on how to include LRT service in their travel patterns (PTP), (3) the evaluation of both programs. In the PTIM, car users received the same general information about LRT service (stops, schedule, tickets, etc.); in the PTP, each user received a personalized travel plan, based on a 7-day activity-travel diary, compiled using an active logger.

The programs were evaluated by a second 7-day diary for the PTP group and conducting a post-survey for the PTIM group and PTP group.

3. THE “CASTEDDU MOBILITY STYLES” PROGRAM

The program proposed in this work, named Casteddu Mobility Styles (CMS), was conducted between February 2011 and June 2012, as part of a European Community funded project called Casteddu Sustainability Lab (CSLab). Once completed, CSLab will form an interactive structure where public administrations will gather all sustainable mobility communication and promotional actions (e.g. public transport, walking and biking) in Cagliari, Italy (Casteddu is the old name for Cagliari). In this context, CMS represented a "pilot study" for identifying the main motivational drivers underlying behavioural change, and the different methodological steps required to implement a large scale program (CSLab).

To this end, a well-defined study context was identified in a corridor connecting the metropolitan area to Cagliari city center with 150,000 round car trips/day. This area is of particular interest since in 2008 a short light rail line “Metrocagliari” went into operation, but to date only 5000 travellers/day use it, about 75% below its capacity. This context offered the opportunity for promoting the use of an existing sustainable mode and therefore reduce the amount of car trips travelled along the corridor. In particular, the light rail service runs frequently (10 minutes), with competitive journey times, and the last stop is located in a highly congested area (long parking times and high parking charges).

The remainder of this section describes the methodology adopted to implement the overall project (see Figure 2) through the identification of the intervention target (par. 3.1), the approach followed for the personalized motivational campaign (par.3.2), and for generalized Campaign (par. 3.3). Paragraph 3.4 describes the Monitoring survey.

3.1 Target of the intervention

The identification of the target for the policy intervention involved two steps: the analysis of current light rail users and the selection of potential users. Both steps were accompanied by a broader promotional campaign, using traditional mass communication tools, including press conferences, web, media, social network and a dedicated website (www.metrostyles.it¹).

¹ In Italian

The objective of the first survey was mainly to profile different types of light rail users and eventually identify among them the most suitable profile for current car-only users. The participants of the survey "*Who uses Metrocagliari?*" were recruited on board, using postcards that redirected them to a web survey. The information contained in the questionnaire concerned (1) socio-demographic and attitudinal characteristics of current rail users, (2) current light rail behaviour (other modes used in combination), (3) past travel behaviour (before the service went into operation), and (4) costs and benefits of travelling by light rail as perceived by the users.

A total of 576 questionnaires were complete (10% of total daily users) and were used for the analysis. In particular, a cluster analysis highlighted the presence of various homogeneous groups by car ownership, trip frequency, travel mode to the station, etc. Among them, an interesting group for the purpose of this study was represented by "convinced park and riders (P&Rs)" who despite owning their own car, preferred to use Metrocagliari on a daily basis. In particular, 17% of the current Metrocagliari users became park and riders when the light rail came into service in 2008. Their main reasons for park and riding were commuting (77%) and shopping (26%). In addition, before the service became available, park-and riders were car-only users (77%) or did not habitually make the same trip (16%); only a small proportion used to travel as car-passenger (3%) or by bus/train (4%). Further, the main reasons that drove them to change their travel behaviour were: less stress than driving in traffic and looking for parking (96%), travel time savings (96%), the reduction of negative externalities on the environment (74%), and finally money savings (65%).

Considering the above and the fact that it would not be necessary to give up the car completely, the park-and ride characteristics were used to define a profile of prospective P&Rs (PP&Rs).

A second web survey "*What are your travel habits?*" was then conducted in order to recruit car drivers, identifiable as prospective park-and riders (PP&Rs). A prospective P&R is defined in this study as a car driver, who owns a car, who can conveniently reach work/study or discretionary locations travelling by car to a parking area, and then taking the light rail to the final destination. A dedicated promotional campaign launched this survey with direct and simple messages drawn from the aspects that motivated the current P&Rs to reduce car use. Some examples of the messages are: <I go shopping downtown, and I park where I want. I use the Metro.>, <My free time is truly free. I use the Metro.>, <I don't waste my time in traffic anymore. I use the Metro.>.

The questionnaire was divided into three sections: (1) residential location information (2) car ownership, and (3) trip mode and frequency of travel to light rail terminus area. Responding to a few questions a number of car-only users with similar characteristics to the current park-and-riders were selected.

In particular, among 1579 questionnaires filled in, 69% were complete, and 46% of these were filled in by prospective park and riders (PP&Rs). Finally, at the end of the selection a total of 235 individuals were invited to join the VTBC program, 59 current P&Rs and 176 PP&Rs. The reason for also inviting current P&Rs was related to their key role as reference behaviour for the motivational campaign and to ensure the presence of a control group during the program. In the end, 109 individuals, 23 P&Rs and 86 PP&Rs, (46% of the invited total) agreed to take part in the personalized travel plan program (PTP) (see Tab. 1 for a summary).

On the other hand, 44 out of 176 PP&Rs, not involved in the PTP, were monitored for the evaluation of PTIM. These individuals were selected so as to have the same daily travel pattern characteristics as the PP&Rs involved in the PTP, but for the duration of the project they were only involved in the general marketing campaign (mass communication, press conferences, web, media, social network and dedicated website).

3.2 The Personalization Approach (PTP)

As reported in previous studies (Stopher, 2005), the high variability involved in daily activity-travel patterns – and especially in the context of soft measures - can be captured using advanced tools such as GPS-based devices and collecting data over repeated observations (i.e. one week).

In light of these considerations, the program proposed in this paper comprised a two-week study. In the first week (before PTP provision) data on existing activity-travel behaviour is collected and used to suggest personalized travel plans; in the second week (after PTP provision) activity-travel patterns are monitored to detect possible behavioural changes.

The advanced device used in this study for daily activity-travel data collection, the Activity Locator (Meloni *et al.*, 2011) is an active logger – smart phone with built-in GPS and activity diary application – that compared to the paper diary ensures more accurate tracking of daily routes and recorded activities. Further, the Activity Locator enables to establish daily contact with a Mobility Advisor, responsible for accurate data collection, facilitating the participant's involvement in the project. At the same time, since the device requires sending the activity and trips information in real time, it is capable of raising individual awareness about personal car use and overuse.

The creation of PTP involved two steps: (1) analysis of one-week observed travel behaviour, and (2) simulation of a PTP to be proposed. The first step included the combination of two types of analysis: activity based analysis and spatial analysis implemented on a GIS. The activity-based approach analyzed P&Rs and PP&Rs behaviour in an attempt to identify their most significant differences. In this context, a 7-day spatial-temporal diagram of activity patterns of each individual was constructed, taking into account the different trip modes used across the different tours. On the other hand, the spatial analysis of activities and trips focused on identifying a set of tours for each participant that could have been conveniently travelled by light rail (prospective P&Rs). For each tour identified, the nearest stop (departure) by distance, time and traffic conditions was identified, as well as the most convenient arrival stop (for a detailed review of the creation of PTP see Meloni *et al.*, 2012).

Each personalized travel plan was delivered in a pocket-size pamphlet divided into three main sections: (1) light rail personalized suggestions (most convenient parking lot, departure stop, arrival stop, *etc.*), (2) general information about Metrocagliari and useful tips, and (3) quantitative feedback section expressed in terms of *Time spent driving*, *Money spent*, *CO2 emitted* and *Calories burned*.

The 109 participants were divided up into 9 groups, each group taking part in a two-week program during the period April 2011 to February 2012.

3.3 The Generalized approach: Public Transport Information and Marketing (PTIM)

In order to compare the effects of the personalized travel plan (PTP) with the generalized campaign carried out for promoting the light rail (PTIM), 44 participants that were included in the target for the survey "What Are Your Travel Habits?" were selected. In this case the 44 PP&Rs had acknowledged the promotional messages launched by the broad promotional campaign distributing postcards and posters, and by the web site www.metrostyles.it, specifically created for the promotion of Light Rail and for VTBC.

The web site was organized into three main sections: (1) issues related to the corridor identified for promotion, expressed in terms of daily car trips, and kilometres travelled, CO2 emitted (2) prospective average benefits achievable at personal level (time spent travelling by car, car ownership and use costs, CO2 emitted, calories consumed (3) general information about the light rail.

In particular, the last section was organized so as to clearly describe the light rail service (stops, frequency, availability and type of ticket), including integration with other systems: light rail + car (Park and Ride), light rail and bus, light rail + bike.

The Park and Ride section provided general information and useful tips for supporting park and ride tours, small maps of each parking area near to the light rail line, showing walking distances between the parking area and the light rail stop, the closest ticket counter and expected arrival and departure times. A light rail timetable was also included.

Light rail + Bus section provided information on road-rail intermodality, showing the different travel opportunities achieved by combining the two systems. Light rail + bike showed the connections of the red line with the bike sharing stations.

In particular, the general marketing campaign lasted from the beginning of the second survey (What are your travel habits), until the end of the project (June 2012).

3.4 The monitoring phase

As explained in the previous paragraphs, one of the preliminary intentions regarding the implementation of Casteddu Mobility Styles was to follow individual behavioural change during program implementation and once it had terminated. The reason for this continuous monitoring was for PTP participants: (1) to verify whether any behavioural change observed in the second week was maintained over time (2) to reinforce the motivational campaign, and (3) to check whether or not a change not detected in the second week could occur after the personalized program had finished.

Analysis of PTIM results aimed to assess the behaviour change for those who had stated their actual behaviour in "What are your travel habits," and had received through the web site general information about Metrocagliari.

For this purpose a third survey called "What are your travel habits after Casteddu Mobility Styles?" was administered. The questionnaire was designed such that participants could recall the answers given in previous surveys, and then change them in relation to the

frequency of light rail use (nothing has changed, I use the light rail more, I use the light rail less) with the corresponding motivations.

In particular, we wanted to compare the behavioural change at the individual level between those who had participated in the program (PTP) and those who received only general information and suggestions on how to use Metrocagliari (PTIM) (Park & Ride, stops, schedules, availability of tickets, type of business, etc.), also in combination with other sustainable transport modes: Light Rail + bus, Light Rail + bike.

4. RESULTS

The behavioural change encouraged by the proposed PTP program was evaluated at two separate times: (1) during the second week of the program (post-intervention week) and (2) three months after its completion (monitoring survey).

As showed in Figure 3, during the second week, 30% of the prospective P&Rs decided to switch from car-only to park-and ride mode (26 individuals), while 61% stated they needed more time but were planning to change in the weeks to come (52 individuals). Nine percent of the PP&R decided not to change at all (8 individuals).

The post interview, three months after the end of the survey (monitoring phase) confirmed that only 27% of PP&R who decided to change in the second week returned momentarily to using the car for his/her trips (7 individuals), whereas 73% of them were still satisfied with their decision and continued to travel by light rail (19 individuals). In addition 23% of those who stated their intention to use the Metro in the coming weeks had actually started using it (12 individuals).

Summing up, three months after the end of the PTP program, 36% of the PP&R subsample had decided to change their travel behaviour (31 individuals), 55% to change in the weeks to come (47) and 9% not to change at all (8).

The car users who turned to park-and ride mode after the PTP program were also asked to indicate the most important factors that determined their behavioural change; reduced stress from driving in heavy traffic and searching for a parking place (94%), the information provided by the PTP program (90%), the positive effects on the environment (87%), time savings (70%) and monetary savings (65%) were the most relevant factors.

These factors are in line with the motivational drivers that emerged in the first survey "Who uses Metrocagliari?" with the exception of the influence of the PTP program that probably stressed the environmental aspects related to travel choices (+13%). It is important to underline that collecting activity travel patterns before and after program evaluation made it possible to detect reduction in kilometres travelled by car as driver and an increase the use of more sustainable modes. A general average decrease of 8% in the distance travelled and of 11% in the number of trips made by car is detected over all daily observations.

Another evaluation process involving the respondents to the larger mass communication program (par. 3.3) at the end of the project revealed that only 9% of the PTIM participants changed their behaviour. This percentage is significantly lower than the PTP program (9% vs. 36%, see figure 3), probably indicating the key role played by personalized information. Nevertheless, it is important to note that mass communication can also play an important role

in promoting travel behavioural change, although this assessment cannot be applied to travel attributes (reduction in the number of car trips, kilometres travelled, *etc.*).

5. CONCLUSIONS

This study proposed a comparison between two different approaches of voluntary behavioural change program to support individual travel behaviour change. Analysis of the results suggests some considerations related to research and policy implications of the proposed study.

The specific results of the study confirm the relevance of motivational campaigns within policies aimed at promoting alternative modes to car use. Both the PTP and PTIM approaches were effective in bringing about behavioural change.

PTP program presented in this work shows that thirty percent of the participants were unaware of the existence of a short light rail line in service in Cagliari, Italy since 2008. This result is particularly indicative of the poor knowledge of existing alternatives to car use. The participants were in fact carefully selected among car-users who, from different destinations drove through the same areas served by the light rail. On the other hand, providing car users with detailed feedback about their current behaviour and existing alternatives seems to have positive effects on behavioural change.

Another finding that emerged from this study is that once car-users experience the benefits of switching to an alternative mode (of their own free will or following a suggestion), they rarely revert to using their cars (this result is promising especially when compared with the backfiring effect of coercive measures on motorized traffic, once that restriction is removed (restricted traffic zones, road pricing, *etc.*).

Second, a mass communication campaign (PTIM) may motivate some behaviour change (9% changed their travel behaviour), but it will be more effective if used mostly as a recruitment tool for personalized travel plans (PTP).

In this pilot study, a PTP program has been implemented using intensive data collection and analysis methods, but at the larger scale, a PTP program can be based on a two-day diary in addition to face-to face conversations with interested volunteers, attracted by a marketing campaign. Third, the behaviour change is not necessarily an immediate outcome of a PTP program, therefore continuous monitoring and reinforcing of the program is desirable (Monitoring survey).

In conclusion, further research is under way using the results drawn from the PTP program and includes the estimation of a behavioural change model. This model is based on the classical discrete choice theory and aims to explore the observed and unobserved factors underlying the joint choice of a certain travel mode then switching to a different mode. Preliminary results show the positive effect of the information provided through the PTP program in encouraging travel behaviour change.

ACKNOWLEDGEMENTS

The Authors wish to acknowledge the Sardinian Government for funding the project (Legge7/2007).

REFERENCES

- Ampt, E. (2003) Voluntary Household Travel Behaviour Change – Theory and Practice, Paper presented at the 10th International Association of Travel Behaviour Research Conference, Lucerne, Switzerland, 10-15 August, 2003.
- Bamberg, S., Fujii S., Friman M., Gärling T. (2011) Behaviour theory and soft transport policy measures, *Transport Policy* 18 (1), pp: 228-235.
- Brög, W., Erl E., Ker I., Ryle J., and Wall R. (2009) Evaluation of voluntary travel behaviour change: Experiences from three continents. *Transport Policy* 16 (6), pp: 281-292.
- Cairns, S., Sloman L., Newson C., Anable J., Kirkbride A. and Goodwin P. (2008) Smarter Choices: Assessing the Potential to Achieve Traffic Reduction Using 'Soft Measures', *Transport Reviews* 28 (5), pp: 593-618.
- Cairns, S., Sloman L., Newson C., Anable J., Kirkbride A. and Goodwin P. (2004) Smarter choice, changing the way we travel. Research report 'The influence of soft factor interventions on travel demand' published by the Department for Transport, London, dft.gov.uk.
- Davies, N., (2012). What are the ingredients of successful travel behavioural change campaigns? *Transport Policy* Vol. 24, November 2012, pp.: 19 - 29.
- Defra (2008) A Framework for Pro-Environmental Behaviours. Annaxes, London. Defra.
- ESRC (2008) Human Behaviour to moving people more intelligently. Economic & Social Research Council. Available at: http://www.esrc.ac.uk/ESRCInfoCentre/Images/ESRC_PP_tran_systems_final_tcm6-29551.pdf.
- Fujii, S. and Taniguchi A. (2006) Determinants of the effectiveness of travel feedback programs - a review of communicative mobility management measures for changing travel behaviour in Japan, *Transport Policy* 13 (5), pp: 339-348.
- Gardner, B. and Abraham C. (2008) Psychological correlates of car use: A meta-analysis, *Transportation Research Part F: Traffic Psychology and Behaviour* 11 (4), pp: 300-311.
- Gardner, G.T., Stern P.C. (1996) Environmental problems and human behavior. Allyn and Bacon, Boston.
- Gärling, T., Fujii S. (2009) Travel behavior modification: theories, methods, and programs. In *The expanding sphere of travel behavior research*. Edited by Kitamura R., Yoshi T., Yamamoto T., IATBR, pp: 97-128.
- Gould, J., and J. Zhou. (2010) "Social Experiment to Encourage Drive-Along Commuters to Try Transit." *Transportation Research Record: Journal of the Transportation Research Board* 2144, pp: -1: 93-101.
- Halden, D. (2008) Personal journey plans – raising the benchmark in travel information and provision, DHC, Edinburgh.
- INPHORMM (1998) Case studies of transport information and publicity/marketing campaigns to reduce car use and promote cycling, walking and public transport, INPHORMM Deliverable D2 to the European Commission. Transport Studies Group, University of Westminster, and partners, London.

- Jones, P., Sloman L. (2003) Encouraging Behavioural Change Through Marketing and Management: What can be achieved? Paper presented at the 10th International Association of Travel Behaviour Research Conference, Lucerne, Switzerland, 10-15 August, 2003.
- Kahneman, D., (2011) Thinking, Fast and Slow. Farrar, Straus and Giroux.
- Meloni, I., Porcu S., Sanjust B, Spissu E. (2012) A voluntary travel behavioural change program: a case study. In: Planning Support Tools: Policy Analysis, Implementation and Evaluation, Proceedings of the Seventh International Conference on Informatics and Urban and Regional Planning, INPUT, pp: 1860-1871, FrancoAngeli Milano.
- Meloni, I., Spissu E., Bhat C.R. (2011) The effect of personal cap-and-trade mileage policies on individual activity-travel patterns. The Activity Locator project. Transportation Letters: The international Journal of transportation Research 3, pp: 293-307.
- Moser G., Bamberg S. (2008) The effectiveness of soft transport policy measures: A critical assessment and meta-analysis of empirical evidence, Journal of Environmental Psychology 28, pp.10–26.
- Richter, J., Friman M., Gärling T. (2011) Soft transport policy measures: gaps knowledge, International journal of sustainable transportation 5 (4), pp: 199-215.
- Rose, G. and Ampt E. (2001) Travel blending: an Australian travel awareness initiative, Transportation Research Part D Vol. 6, pp: 95-110.
- Stopher, P. (2005) Voluntary travel behaviour change, in K.J. Button and D.A. Hensher (eds.) Handbook of Transport Strategy, Policy and Institutions Vol. 6, Elsevier.
- TAPESTRY (2003) Best Practice Guidelines (Deliverable 5). Report to the European Commission (DGTREN). Travel and Transport Research, Nottingham and partners.
- Taylor, M., Ampt E. (2003) Travelling smarter down under: policies for voluntary travel behaviour change in Australia, Transport Policy, 10 (3), pp: 165-177.
- Thaler, R. H. Sustain C.R. (2008) Nudges. Yale University Press.
- Thøgersen, J. (2009) Special issue on Evaluation of Programmes Promoting Voluntary Change in Travel Behaviour Promoting public transport as a subscription service: Effects of a free month travel card Transport Policy Vol. 16, Issue 6, pp: 335–343.
- Verplanken, B., Hofstee, G. and Janssen, H.J.W. (1998) Accessibility of affective versus cognitive components of attitudes. European Journal of Social Psychology 28, pp: 23-35.

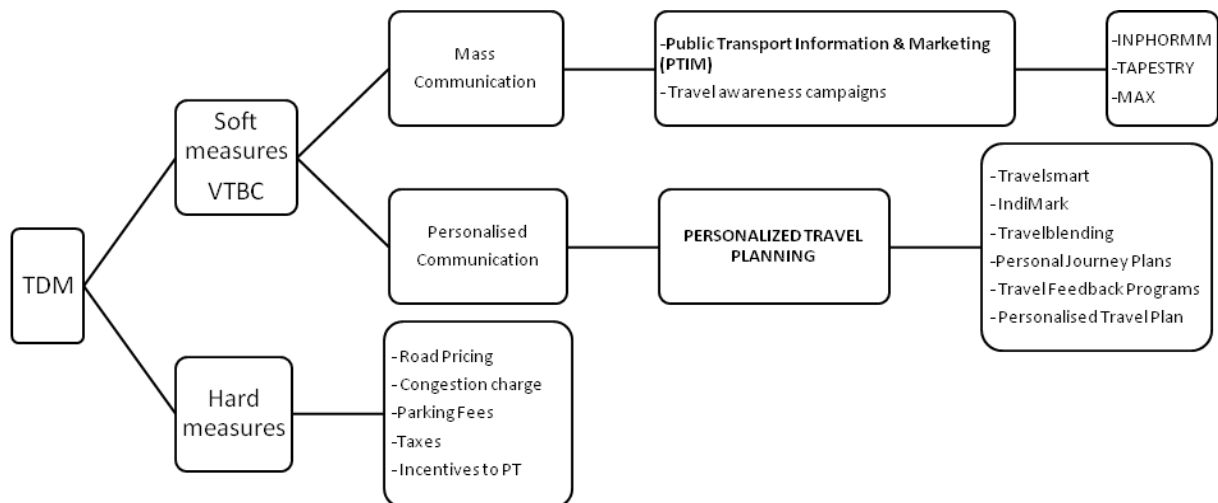


Figure 1 – Travel Demand Management measures classification

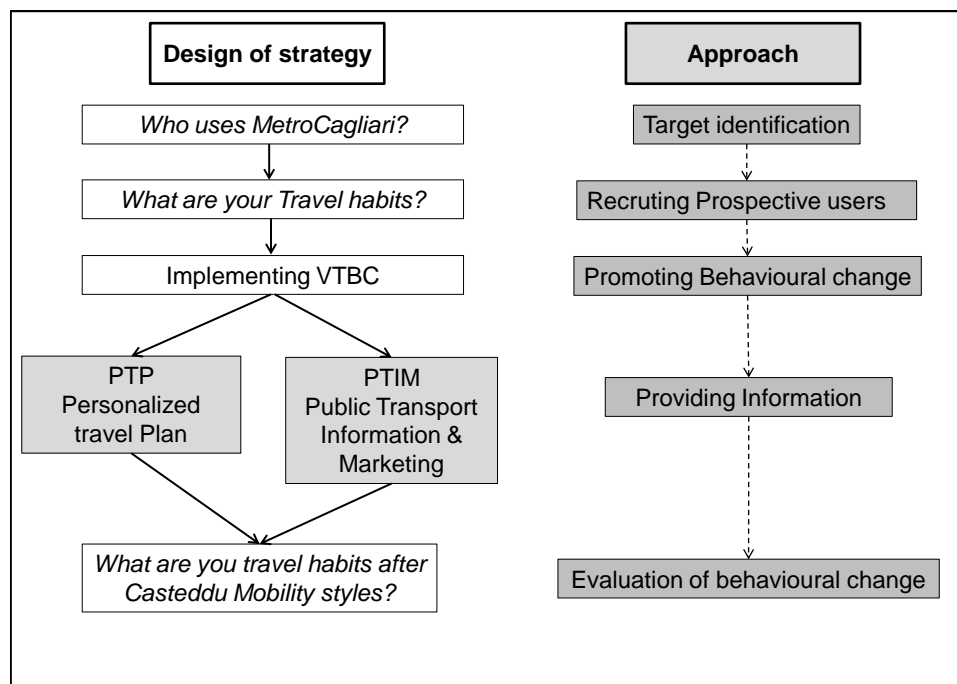


Figure 2 – Strategy and adopted approach

The impact of different voluntary travel behaviour change programs on sustainable policies
 SANJUST, Benedetta; MELONI, Italo; SPISSU, Erika

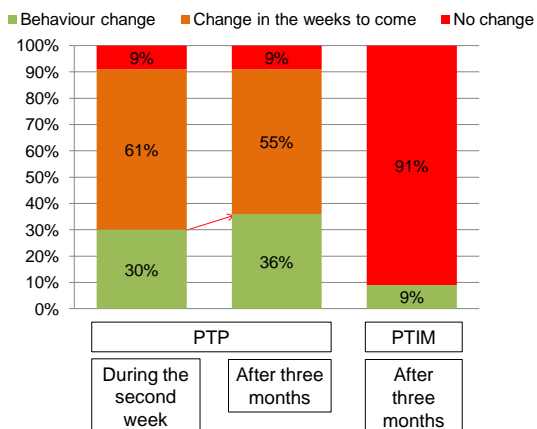


Figure 3 - PTP program vs. PTIM behavioural change evaluation

Tab. 1 - Selection of participants

	Who uses MetroCagliari? (Metro users)	What are your travel habits? (Non-metro users)	All
Intercepted (Postcards only)	1250	1250	2500
Filled in surveys (surveys/postcards)	692 (55%)	1579 (131%)	2271 (90%)
<u>Complete (Complete/ Filled in)</u>	<u>576 (83%)</u>	<u>1094 (69%)</u>	<u>1670 (74%)</u>
<u>Targeted (Targeted/Complete)</u>	<u>98 (17%)</u>	<u>507 (46%)</u>	<u>605 (36%)</u>
<u>Invited (Invited/Targeted)</u>	<u>59 (60%)</u>	<u>176 (35%)</u>	<u>235 (39%)</u>
Final participants (Final/Invited) PTP	23 (39%)	86 (49%)	109 (46%)
Final participants (Final/Invited) PTIM	-	44 (25%)	44 (18%)