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TRAVELLERS' PROFILES DEFINITION USING STATISTICAL MULTIVARIATE ANALYSIS OF ATTITUDINAL VARIABLES

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ABSTRACT

This paper aims at presenting a set of travellers' typologies using attributes characterizing people's attitude, through an Exploratory Factor Analysis (EFA), and a subsequent cluster analysis (CA), based on the obtained latent constructs. The final goal is to contribute to deepen the knowledge on market segmentation in order to define more people-oriented transport policies, focussing on a medium size city Italian city, Alessandria. Six factors have been defined on which the k-means Cluster Analysis has been applied finding four travellers' profiles.

Results confirm certain hypothesis from behavioural psychological theories. Attitude-behaviour relationships loosen when habits, consolidated in time, do intervene; moreover in small-medium urban context, as opposed to large and dense cities, insufficient transport supply does not favour the use of alternative modes to the motor vehicle, if not to the cost of a great loss in efficiency. In fact, the study shows how significant constraints such as necessity, time saving, and low transport supply (mainly designed around students going to school) are in determining a behavioural change, so that the "right general attitudes" are not sufficient to obtain a real modal shift. This leads to expect opportunistic behaviours, even within a overall positive attitude towards the environment. Actually,

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that overall positive attitude is not enough to prompt consistent behaviour unless a marked self-control and strong motivation are present. These two features seem to be missing in the interviewed sample of population, unlike what emerges from other studies undertaken in Northern Europe. The geographic location most likely plays a significant role in such a difference. Indeed, cultural background and the prevailing habits of the population may well explain the "slackening" of the bond between moral norms and behaviour, and the subsequent search for surrogates (e.g. the high willingness to pay for environmental protection) to justify the unwillingness to forgo the private vehicle on behalf of more sustainable modes.
Finally, our study seems to prove that education could play a key role in transport policy formulation but, moreover, in social policy, as individuals more akin to modal shift are those showing higher levels of instruction.

Keywords
Travel behaviour, user profile, attitude, factor analysis, cluster analysis

1. Introduction

The current trend in transport planning and management is to pay growing attention to policies addressed to reduce environmental concerns and to respect the strict constraints the international community is setting. Massive use of motor cars is one of the main causes of many environmental problems. Steg (2005) highlights that modal diversion analysis requires adequate knowledge about motives for car use, so that policy action can be targeted towards the most significant factors.
A great deal of literature is aimed at the identification of the typical characteristics of people who are willing to change travel behaviour, defining segmentation approaches based on behavioural or socio-economic and demographic variables. This approach does not allow us to shed light on the motivations of behaviour. While in psychological research models are based on the attitude-behaviour relationship, in the transport sector the users' segmentation based on such relationship has been rare, even if several studies analyze the psychological determinants of modal choice (Hunecke et al., 2010).
People's choices in transport become more complex and less rationally explainable, as users' choices and behaviour do not often seem to follow an economic logic or a fully rational thought. The theory of individual choice behaviour, which has its roots in the economic consumer theory, states that, apart from casual mistakes, random utility ε contains irrational aspects of the behaviour which cannot be expressed with a mathematical or economical model (Ben Akiva and Lerman, 1985). However, economically unexplainable behaviour cannot be all considered as irrational; personal feelings, perception and attitudes may assist in explaining and predicting travel behaviour, and so does a more accurate market segmentation, grouping customers with similar needs and motivations (Wedel and Kamamura, 1998).
A great amount of research about travellers' preferences has shown that the perception of travel options is complex due to the mix of internal and external factors that influence choices. Collantes and Mokhtarian (2007), for instance, have presented a variety of personal factors which determine subjective assessments of mobility: personality traits, travel-related attitudes, lifestyle characteristics, and affinity for travel. Other researchers have found that general attitudes, travel experiences and emotions also influence travel behaviour significantly (Handy et al., 2005; Sheller and Urry, 2006). The analysis of the people's characteristics is also relevant to understand how people react to possible transport policy measures (Steg and Vlek, 1997; Schade and Schlag, 2003). Therefore, the definition of traveller typologies through the segmentation of the population in terms of attitudinal, sociological and psychological variables could allow the definition of a set of policies tailored to different "groups".
An interesting example comes from Götz (1999) who proposes to improve public transport, walking

and cycling through the analysis of underlying motivations and symbolic content of modal choice, adopting a classification of mobility styles for marketing addressed to specific target-groups. In fact, Götz argues that the understanding of people's mobility involves the integration of physical (movement), social (accessibility) and reflected (social positioning) aspects.
This paper aims at presenting a set of travellers' typologies using attributes characterizing people's attitude, through an Exploratory Factor Analysis (EFA), and a subsequent cluster analysis (CA), based on the obtained latent constructs. The final goal is to contribute to deepening the knowledge on market segmentation in order to define more people-oriented transport policies.
The paper starts with a literature review on market segmentation using attitudinal and behavioural variables (section 2), showing some relations or differences with our research. On this basis, a methodology has been set out and presented in section 3 where the survey carried out to investigate people's attitudes and behaviour is described and the statistical analysis design is explained. The results of EFA and CA are presented in section 4 and further discussed in section 5, while some final considerations are set forth in the conclusions, comparing the obtained results with relevant literature outcomes

2. Literature review

Travel behaviour has been seen mainly as a function of pure socio-demographic attributes; however, several researchers in the last few decades have argued that individuals' personality, attitudes and perceptions have a great influence in predicting it.
Among the first studies using attitudes to segment transport users, Pas and Huber (1992) defined the rail users' groups in relation to their willingness to change behaviour, and Davies *et al.* (1997) classified groups of cyclists based on attitudes to this mode of travel. Those researchers analysed particular groups of users, using a specific transport mode, while Jensen (1999) carried out one of the first studies in transport, using a sociological perspective, to investigate some of the mechanisms behind the transport behaviour as it appears in today's society. She analysed the influence of attitudes on the individual's own explanations and perceptions of behaviour and attitudes, defining six mobility typologies for Danish people based upon 20 in-depth interviews: the passionate car drivers, the daily life car drivers, the leisure time car drivers, the heartedly cyclists/public transport users, the cyclists/public transport users of convenience and the cyclists/public transport users of necessity.
Subsequent studies continued to investigate the travel behaviour under a sociological and psychological point of view, but applying travel behaviour theories to the transport sector.
Wall et al. (2007, 2008) explained the commuting modal choice comparing the two best established travel behaviour theories: Norm Activation Theory (NAT) (Schwartz, 1977) and the Theory of Planned Behaviour (TPB) (Ajzen, 1985).
The Norm Activation Theory (NAT) originally formulated by Shalom Schwartz, posits that two conditions are required for an individual to activate a norm. First, the individual must accept that there is a public good/bad aspect of his/her private actions. This is called awareness of consequences. Second, the individual must ascribe personal responsibility to the issue at hand. These conditions are necessary, but not sufficient, for making moral decisions.
The TPB is based on the concepts of attitudes, perception of social norms, and perceived behavioural control. Attitudes can be defined as positive or negative evaluations or beliefs held about something that, in turn, may influence one's behaviour. They typically include cognitive, affective and behavioural components (Parkany et al., 2004). Knowing people's attitudes could provide a useful, though not infallible, guide to their likely behaviour because attitudes seem to influence intentions to act and their translation in behaviour may be constrained by circumstances (Ajzen and Cote, 2008). Unlike personality, attitudes are expected to change as a function of acquired experience. The NAT is more pegged to moral considerations and altruistic behaviour that go beyond the scope of this work, whereas the approach based on attitudes and behaviour is more akin to the TPB theory.
Bamberg and Schmidt (2003) analysed the use of car by students travelling to the campus and

found that choice of travel mode can be affected by interventions that produce change in attitudes, subjective norms, and perceptions of behavioural control. Furthermore, when circumstances remain relatively stable, past travel choice contributes to the prediction of later behaviour. Of course habit has emerged as an important component in modal choice, but other aspects also appeared significant. Perceived personal features of car use (e.g., speed, flexibility, and less stressful) do have a significant influence on the intention to use this travel mode. Surprisingly enough, the perceived external and self-generated social expectations seem to have a stronger influence than habit in the intention to use the car for university routes. Young people are probably more sensitive to perceived social expectations than adults, and sometimes show more sustainable behaviours and favourable attitudes to modal change, as our study has proved.

The above results are significant in defining which behavioural mechanisms policy makers have to consider in transport planning, in order to lead users' choices towards sustainable transport. Steg (2005) examines various motives for car use in the Netherlands and suggests that policy makers should not focus exclusively on instrumental reasons for car use, but they should, likewise, take into consideration the various social and affective causes. It is clear that the process to induce a modal diversion finds some obstacles due to different personal constraints caused by work typologies and family needs. But also the daily activities and habits could spur a rigidity to change, even if opinions towards modal change are favourable. In fact, the choices made for the daily trip represent a repeated behaviour which can gradually become a habit and this very repetition hinders the ability of people to change it (Aarts et al., 1998). In particular situations, when there are important changes in the context, (i.e. moving house or job) people are less constrained in their habits and, thence, more open to behavioural changes (Harms, 2003; Karash et al., 2008). Fujii and Gärling (2003) also argued that context is a true determinant of actual behaviour.

In our case study the habit is analysed through the questions related to the “most frequent trip”. This trip is considered because its frequency and repetitiveness for the interviewed people makes it the best-known trip. In the literature, this is usually referred as commuting or home-to-work trip. For example Ory et al. (2004) worked on commuting trips claiming that travellers attitudes and personality (representing motivations) are more determinant to “travel liking” than objective travel amounts. The variable classification used in their survey covers different aspects classified by the authors in: Objective Mobility, Subjective Mobility, Relative Desired Mobility, Travel Liking, Attitudes, Personality, Lifestyle, Excess Travel, Mobility Constraints, and Socio-demographics. Johansson et al. (2006), analysing a sample of Swedish commuters, found that both attitudes towards flexibility and comfort, in addition to being environment-friendly, influence the individual’s modal choice. In other cases (Ellaway et al., 2003) self-esteem, protection, autonomy, and prestige are personal and important features that prompt people to use a car – also confirmed by Steg (2005) – showing the necessity to build more comfortable, flexible, and attractive public transport means to capture and lead car users towards more sustainable transport options.

However, some other studies, not only focused on commuters (Anable, 2005), have adopted the TPB to indentify travel behaviour segments within the visitors of the National Trust Sites in the north-west of the UK. She identified “complacent car addicts” versus “aspiring environmentalists”, amongst other profiles. Even if the specific sample, made up by tourists, could have led to an overestimation of some environmental and naturalistic tendencies, some suggestions have been drawn from Anable’s segmentation, even if, in our study, the analysis is carried out over a random sample not coming from a particular group.

In our research several behavioural and attitudinal aspects are investigated, mainly those in Ory et al. (2004). Arguably, less attention is given to excess travel, while more interest is paid to travel liking, attitudes towards travel, personality traits, attitude towards time saving and the willingness to pay to reduce air and noise pollution, focusing on the most frequent trip. Thus, we decided to mix attitudinal and behavioural questions with typical stated preferences (SP) questions concerning willingness to pay and trip time reduction. In a few cases, SP surveys are associated to TPB theory; for example, Fujii and Gärling (2003) suggest that behaviour has two preference components: core

preferences, invariant over the time and across situations, based on habitual behaviour such as daily commuting; and contingent preferences, based on the actual context and situation. They use SP surveys to quantify the "core preferences" arguing that stated preferences could not reflect the "core preferences" but just represent behavioural intention, and the inconsistencies between behavioural intention and actual intention are to be ascribed to contingency preference caused by people context, habits and lifestyles.

Lifestyles are meaningful to travel behaviour. They are not only determined by socio-economic and demographic variables, but are also related to individual values and attitudes (Hunecke et al., 2010). Few researchers have attempted to segment population on the basis of lifestyles. Redmond (2000) used both attitudes and lifestyles for travellers' segmentation, defining 6 attitudinal types and 11 groups based on characteristics related to personality and lifestyle. Hunecke and Schweer (2006) (as mentioned in Hunecke et al., 2010) tested socio-demographic, lifestyle, and attitudinal variables to understand the predictive power of the modal choice and destination frequency. Chliaoutaki et al. (2005) used lifestyle traits as predictors of driving behaviour in urban areas of Greece, focusing on car users. In this case lifestyle factors are defined and related to a specific "aberrant driving behaviour" referred by the authors as ordinary violations, errors, and aggressive violations. In our case we do not consider this kind of behaviour, but just test how simple lifestyle characteristic stand to influence the modal choice and travel perception.

A complementary strand of travel behaviour research has been dealing with external factors, such as the residential environment and the availability of transport. In fact, Stradling and Anable (2008) argue that environment characteristics or land use effects influence transport patterns and choices and, likewise, the location of trip origins (e.g. homes) and trip destinations such as jobs, shops and recreations can be shaped by the topography of the terrain.

In their work, Meurs and Haaijer (2001) contributed to better understand the extent to which the spatial structure of the residential environment can explain mobility, in general, and modal choice, in particular. In addition they analysed the role of spatial planning and mobility management issues. Their research proved that mobility and the choice of transport modes are directly linked to characteristics of the spatial environment. According to their conclusions, the "impact of the characteristics arising from the residential environment is considerable, at 20%, although this relative effect varies with mode of transport, from about 10% for car trips to 40% for journeys on foot" (Meurs and Haaijer, 2001, p.445). Helminen and Ristimäki (2005) show how the labour market has expanded the commuting area of employed persons and, likewise, the commuting distance, thus altering trip frequencies and inducing higher rates of telework. Travel behaviour changes also with distance: for more than 100km people opt for a second dwelling unit, closer to the working place, with just one home to work return trip during one week.

However, even for people living in big cities, the transport supply is not always sufficient to allow them efficient connection with their working place. Kawabata and Shen (2006) analysed three cities in USA (Boston and Los Angeles) and Japan (Tokyo), showing that zones with high job accessibility by public transport are limited to small portions of the metropolitans area. The comparison of the three cities show that "the mean job-accessibility value for transit users with 30-minute commutes in Tokyo was more than six time higher than in Boston and more than ten time greater than that in Los Angeles" (Kawabata and Shen, 2006, p.125). It is clear, in these cases, that the public transport accessibility is a variable influencing commuters' behaviour, inducing people to use the car and creating social differences and disadvantages in accessing to economic opportunities.

Other research results, however, point out that people are more affected by their own perception of modes rather than the mere existence of those modes (Hesse and Trostorff , 2000; Kuhnimhof et al. 2006). This is an interesting issue, partially confirmed by our own study, even if the lack of a real public transport network has emerged as a key factor in the attitude-behaviour relationship.

The literature shows how several factors play a role in mobility choices, interacting among them and making difficult behavioural previsions. An attitude-behaviour as well intention-behaviour gap

do exist. In fact, we can observe how different attitudes can lead to the same behaviour, because the context (contingent preference) can change the core preference, and the lifestyle and habit can equally weaken it. To this extent, Fuji and Gärling (2003) argue that behavioural intention better predicts the behaviour than other measures because it implies a commitment to act in addition to the desire to act (core preference). Nevertheless, they add that there are some other factors affecting the relation intention-behaviour or behavioural intention-behaviour that are defined *errors of omission* and *errors of commission*. The error of omission relates to not choosing an alternative after having declared an intention to choose it; it can be caused by strong "habitual" target behaviour (behaviour towards which a behavioural intention is formed) and impulsiveness of target behaviour. The error of commission differs from the previous one as the respondent fails to choose an alternative after having stated their intention to choose it; it depends on a strong "habitual" alternative behaviour (a behaviour chosen as an alternative to a target behaviour), weak intention, unrealism of plans to implement target behaviour, and low actual behavioural control and optimism bias. If we add the errors coming from the social desirability and strategic responding biases, we can fully understand the complexity of the framework.
The current research aims at contributing both to test the influence of socio-demographic factors on travellers, and to assess which are the most relevant attitudes for defining travellers' profiles in a Southern European context, using a CATI (Computer Aided Telephone Interview) survey on a stratified sample from a medium size Italian city.

3. Methodology

Understanding the influence of attitudes on the behaviour of a population living in a city in the north-west of Italy involves two steps. The first one is geared to reveal the interdependencies between attitudinal variables, finding eventual latent constructs through exploratory factor analysis. The second step aims at defining homogeneous groups of travellers, through the use of cluster analysis, based on the defined latent constructs.
In our work we decided to focus on attitudes and behaviours related to the most frequent trip made by respondents, independently from its purpose and people occupation (workers, students, retired people, housewives, etc.). The idea is that the most frequent trip is the best known for users in terms of time and general constraints. The most frequent trip could induce a specific mobility behaviour, regardless of people characteristics (employed/unemployed) and trip purpose (work, shopping, etc.), and it is more related to people habits, less likely to be changed. For this reason it is interesting to study the relationship between people attitudes and this type of trip that involves "rigid rules" in terms of behaviour.
Thence, our approach wants to stand away from some studies, where the research is focused on the trip to work. However, in other studies the segmentation is obtained or applied on a pre-defined users' typology, based on:

- the mode used to travel, without taking into account the typologies of trip (most frequent or otherwise), differentiating private car users from public transport users (Jensen, 1999), and considering car availability to split attitudinal clusters in two groups: car-owners and not car owners (Anable, 2005). In other cases the researchers do concentrate on a single mode: railway (Pas and Huber, 1992), metro (Pronello and Rappazzo, 2010), bicycle (Davies et al., 1997), or the private car (Steg, 2005; Chliaoutaki et al., 2005; Choocharukul, 2008);
- the trip purpose, differentiating the trip to work from all other purposes, and considering only one category: commuters (Redmond, 2000; Lieberman et al., 2001; Outwater et al., 2003; Choo and Mokhtarian, 2004; Johansson et al., 2006; Shiftan et al., 2008) or tourists (Anable, 2005) where the defined clusters are described in terms of current and future behaviour and intention related to leisure trips (for National Trust);
- the gender (Zhou et al., 2004; Beirão and Cabral, 2008).

The objective is to define homogeneous travellers' groups based only on attitudinal variables, regardless of the behaviour in terms of mode and trip purpose and, thereon, to observe if the clusters

show differences both in terms of behaviour and social characteristics. In fact, today haste and stress conditions seem to cut uniformly across demographic and behavioural characteristics and each individual allocates to his/her most frequent travel the same features assigned by workers to their commuting trip. Actually, this trend emerges from our research in the definition of the clusters (section 5).
Finally, the last point to be mentioned is that a significant amount of the studies refer to car users or, when public transport users are considered, those living in big cities where the public transport supply is generally well developed. Studies in small and medium size cities are lacking and it would be worth to investigating if people living there show similar attitudes to those of citizens in big cities, and how much the transport supply can lead to discrepancies between attitudes and behaviour, mainly for people boasting pro-environment positions. In this case the role of context as true determinant of actual behaviour (Fujii and Gärling, 2003) will be checked.

3.1 The sample

Our research wants to test the situation of the medium size cities and Alessandria was chosen as a case study from which the sample should be drawn. Alessandria has about 85,500 inhabitants and is located in Piedmont region, in the north-west of Italy, having an industrial and services economic base.
The survey was designed to test a pricing policy option in the city centre and was not meant to be analysed using a common factor model, as done in other studies where an expanded version of TPB was the theoretical framework used for the selection of attitudes in the segmentation process (Anable, 2005; Hunecke et al., 2010). However, as the survey was focused to investigate people attitude towards travel and transport policies as road pricing, the obtained data are well suited to behavioural analyses.
The sample was drawn from the resident population, using a stratified sampling plan based on the age, occupation, and residential location. Only people over eighteen years old were considered as, in Italy, this is the minimum age for obtaining the driving license. Concerning occupation, we considered general workers, students, housewives and retired people. For the residential location, the sample was stratified according to ten zones in which the study area was divided (23 within Alessandria municipality and 6 in the suburbs).
The stratified sample was made up by 690 respondents, corresponding to the 83% of the estimated sample and providing an error parameter at three percent with a 95% interval of confidence. The high response rate was also due to the great effort made to advertise the survey through the local media.

3.2 The questionnaire

The questionnaire was administered using a CATI (Computer Aided Telephone Interview) method and included four sections:

1. collection of revealed preferences data for the most frequent trip undertaken by respondents on both week-days and week-end: trip destination, purpose, duration and transport mode;
2. collection of information regarding the attitudes about the most frequent trip and travel in general, public transport, traffic conditions, and the environment, with a few questions about the respondents environmental sensitivity and willingness to pay (WTP) for improvements of the city air quality and noise;
3. applications of the stated choices (SC) games about, respectively, an improvement of the environmental conditions and an application of car limitation policy (road pricing);
4. investigation on socio-demographic aspects of respondents and their household: gender, age, education, residence, family size, employment situation, income and number of vehicles owned.

The designed questionnaire is based on a review of several surveys found in the research literature (Jensen, 1999; Richardson et al., 1995, Ory et al., 2004), adjusted to the Italian population in accordance to the results of a focus group conducted with a sample of residents in the province of

Turin (Torino), the capital of the Piedmont region, located 90 km from Alessandria (our case study) (Cortese, 2004).
Section 2, in particular, contained 46 questions to research specific attitudes towards the mode used and time savings, the trip and its characteristics, as well as towards the willingness to pay (WTP) for improving environmental conditions, and to access to the city centre in case of a pricing scheme. Finally, personality traits of respondents have been investigated too.
Most of the above variables are ranked on a Likert scale from 0 to 10 (Likert, 1932) or from 0 to 5 for the personality traits question, as a 0 to 10 scale would have been too detailed for describing life styles in connection to travelling. The data can be treated as discrete quantitative data, so that the use of multivariate data analysis is allowed. The variables regarding the WTP are expressed in Euros, ranging from 0 to 25 €/week in case of air and noise pollution, while from 0 to 21 €/week for the access to the city centre. For the environmental values the requested amounts were rated in Euros/year, from 0 to 1,300 €, while daily figures, from 0 to 3 €, were asked for the access to the city centre. The values were then converted in weekly amounts to obtain comparable figures.
Out of the above mentioned 46 attitudinal variables, 27 were selected for the study to describe each user (Table 1). Some variables contained in the questionnaire were not taken into account in the analysis because many values were missing or because they were binary or nominal. The sample of 690 units was then reduced to 663, since 27 persons did not make any trip and not answered to the questions related to specific attitudes on the mode used.

3.3 Data analysis design

As hinted above, in order to evaluate the presence of "unobserved" or "latent" variables influencing the travel behaviour, an EFA has been performed. Cronbach's alpha coefficient has been calculated to have a first evaluation of the internal consistency of the items included in the factor analysis. The results were satisfactory, with an alpha value always greater than 0.71. The Shapiro-Wilk normality test was applied and showed that data are not-normally distributed. All the measures conducted to evaluate test reliability and sampling adequacy allowed us to proceed with the application of the factor analysis. Principal Axis Factor (PAF) extraction method was performed through the software BMDP (BMDP, 1992). The advantage of PAF is of entailing no distributional assumptions, most appropriate in this case of not-normally distributed data. The number of factors was chosen through the scree test, jointly used with the Kaiser criterion of computing the eigenvalues for the correlation matrix, to avoid eventual distortions in the results (Fabrigar et al., 1999). Then, factors are rotated to obtain a simple interpretation and the oblique rotation has been chosen as it permits correlation among factors. In case the factors structure involves orthogonal factors, a successful oblique rotation provides estimations of the correlations among factors that are close to zero and produces a solution quite similar to that obtained by a successful orthogonal rotation (Fabrigar et a., 1999). Like in Wall's work (Wall et al., 2007) the oblique rotation was preferred, confirming a certain degree of correlation among factors.
The identification of the factors allowed us to consider new variables upon which to base the successive cluster analysis. The score for each person was calculated as a summated scale of the variables forming each factor. The result was an indicator of the global opinion of each respondent to correlated items and could be considered as a sort of attitudinal test towards the perception of transport means and travel. These multi-dimensional attitudes were used to segment the sample, using k-means cluster analysis.
Cluster analysis covers a variety of techniques. A common class of methods is based on iterative relocation (or iterative partitioning). K-means clustering uses the iterative relocation with the sum of squares criterion (Mac Queen 1967). Although considerable research efforts have been undertaken in this area (e.g., dendrogram analysis for hierarchical clustering), there is little systematic guidance associated with these methods for solving basic practical questions such as how many clusters there are, which clustering method should be used, and how outliers should be handled (Fraley and Raftery, 2002).

Hierarchical clustering and k-means clustering are suitable for continuous data (Everitt et al. 2001) as they are based on Euclidean distances, finding an average of several patterns.
Since the late 1990s, researchers stated that cluster analysis can also be based on probability models (Bock 1996, 1998a, 1998b), something that has led to the development of new clustering methods where data are generated by a mixture of underlying probability distributions. An advantage of using a statistical model is that the choice of the cluster criterion is less arbitrary (Vermunt and Magidson, 2002). Fraley and Raftery (2002) highlight that "some of the most popular heuristic clustering methods are approximate estimation methods for certain probability models".
Nevertheless, the k-means cluster analysis has been chosen as it is suitable for our continuous data; it is simple, keeping the complexity of the analytical procedure at a reasonable level, and, then, providing a tool which is more readily usable in a decision-making process; and it has been often used in previous researches, allowing a comparability of results. To support the choice, however, the cluster analysis was carried out on the whole sample and on two different random subsamples (half of the total sample), varying from 3 to 6 cluster solutions. It has been interesting to observe that a strong stability of the solution was referred to 4 clusters where one of the 4 was always very small, of course even smaller than for the whole sample, but maintaining its specificity.
The k-means cluster analysis was applied to latent constructs individuated through EFA. However, the F-like-ratio was used to indicate the relative importance of the factors in determining clusters and support the final choice.
Finally, a cross-analysis with socio-economical, attitudinal (the ones that were not used for the EFA) and behavioural variables has been performed to understand which socio-economic characteristics and users' attitudes play a relevant role in differentiating the obtained clusters. As collected data had a non-normal distribution, the Mann-Whitney non parametric test was used.

4. Results

The results from the factor analysis show that there are six latent constructs on which to perform the market segmentation through the k-means Cluster Analysis that allows us to define four travellers' profiles. The resulting clusters are quite informative and policy relevant, highlighting the importance of attitudinal items.

4.1 Latent variables and their interpretations

Six factors were extracted, explaining 87.2% of total variance. The pattern of rotated factor loading is presented in Table 2, where the loadings having a score higher than ± 0.35, on the 27 variables, are highlighted for each factor.
Before giving an interpretation of the factors, it is interesting to observe which are the average scores given by respondents to the different variables forming the factors. In table 3, the medians for the variables expressed by a Likert scale of 11 points (0-10) or 6 points scale (0-5), are given as also the mean value of WTP (expressed in Euros). In addition, to have a clear vision about the modes used by the respondents, the data show that 354 persons used the car (312 as drivers, 40 as passengers, and 2 as taxi passengers), 112 the train, 25 the bus, 40 the bike and 131 preferred to move on foot.
As displayed in Table 2, the *first factor*, named "*travel pleasure*", is mostly related to general attitudes towards the travel, expressed by judgments regarding the reason why people usually move: that is the pure enjoyment of travelling, the pleasure of experimenting different alternative routes to arrive at the same destination, the sense of relaxation obtained from the trip, the possibility to think, to meditate and to enjoy the loneliness, the excitement of visiting new places. In addition, the other main variable loading the factor are related to the personality traits of the respondents in terms of general attitude to move. The last two variables loading the factor, even if less important than the previous ones, express the importance of carrying out activities during the trip (e.g. reading, listening music, etc.) and the importance of the pleasantness of the route scenery. This factor expresses travel satisfaction or enjoyment as a general attitude towards travelling. People having

high scores for this factor see travelling not as derived demand but, rather, as an intrinsically desirable activity for a wide range of reasons: curiosity, variety-seeking orientation, enjoyment of a route (Mokhtarian and Salomon, 2001), just for its intrinsic symbolic value (status, independence), or as an escape .

The *second factor*, "*high time saving desirability*", concerns the specific attitude towards time saving in the most frequent trip, defined by the question: "Regarding your most frequent trip, what is your degree of satisfaction/pleasure in saving a certain percentage (varying from 0 to more than 50%) of travel time ?". In the second factor the time reductions vary from 30 to more than 50%: the increasing desirability for higher time reductions (from score 5 to 10) is shown in Table 3

The *third factor*, "*Environmental WTP*", presents high loadings on two different items related to individuals' willingness to pay for an improvement of the city air and noise pollution. Table 3 shows, on average, a modest WTP of the respondents (2-2.5 €/week) and that noise is perceived as less important than air pollution. In fact, even if noise is one of the costs ascribed to the transport systems, it is undeniable that its effects on health are usually considered less serious than those produced, for example, by air pollution. This could be due to the less evident effects on health produced by noise, which are more stress-related and, hence, difficult to distinguish from other causes. In addition, it is often overlooked that noise acts as an important co-stressor, interacting with other causes, such as air pollution, in producing adverse health effects (Hadeira et al., 1990).

The *fourth factor*, "*low time saving desirability*", concerns, as the second one, the specific attitude towards time saving in the most frequent trip, in this case varying from 0 to 20% of travel time reduction, while in the second factor the time reductions vary from 30 to more than 50%. Table 3 clear shows how people are scarcely interested in none or limited (10%) time reduction, but also a saving of 20% does not seem to appeal much the respondents.

The *fifth factor*, "*mode performance*", includes variables regarding the specific attitude towards the mode used in the most frequent trip, expressing the perception that the preferred mode is the fastest and most adequate one, creating a sensation of freedom and comfort, and that the most important thing is a prompt arrival at the destination. In addition, the factor includes also the variable regarding the general attitude towards the importance of travel speed. All these variables have received, on average, high scores from the respondents, highlighting the importance of using efficient, comfortable and fast modes in the current "pressured" society where the time is often perceived as scarce.

The *sixth factor*, "*mode pleasure*", as the previous one, contains variables regarding the specific attitude towards the mode used in the most frequent trip, but oriented to the perception of its connection with landscape, to the respect of the environment and, last, to the pleasure induced by using the mode. Such a pleasure is expressed by the taste of driving for the car users, the unpleasantness of driving and the preference for using train and bus, for train and bus users, as well as the enjoyment of bicycle riding or walking, for bikers and walkers.

4.2 The users' psychographic profiles

The defined six latent constructs were used as the new six variables on which to conduct a cluster analysis. Each factor assumed the value obtained summing up the variables making it up. Thus, the factors were measured by a quantitative score ranging from 0 to 75 for factor 1; from 0 to 40 for factor 2; from 0 to 50 for factor 3; from 0 to 30 for factor 4; from 0 to 40 for factor 5; from 0 to 30 for factor 6 and, then, standardized for the successive analysis, since the variables range in different intervals.

Furthermore, in order to confirm people's features, additional criteria based upon deeper information on the population, through descriptive and inferential analysis of data and other statistical data at regional level (survey conducted by the Region in 2004), were used

Each of the four clusters represents a specific combination of attitudes, lifestyles, preferences, showing a unique psychographic profile. Table 4 displays the segments based on the above latent constructs, reporting the groups' size and the cluster means (centres) and within-cluster standard

deviations computed from un-standardized data. F-like-ratio is also reported in Table 4, where the first four factors are the most important variables in determining clusters, while "mode performance" and mode pleasure" are less significant. Figure 1 represents the scatterplot of the four clusters and the cluster profile plot showing how the factors contribute to shape them.
The *first cluster* contains 235 individuals and it is the largest one (35.4%). As depicted in figure 1, this group is high on "travel pleasure" and on the factor related to "mode pleasure". Important is also "mode performance", but this factor is relevant for all the clusters, except the second one. The persons forming this group show a high pleasure in travelling, in adventure travels, in visiting new places and they consider the trip a way for relaxation and thinking, while enjoying the landscape. These individuals perceive the travel not only as a means to reach a certain destination, but also to derive a certain pleasure from the travelling activity. As for the mode pleasure they show a higher enjoyment in staying in connection with the landscape thanks to their mode. Cluster 1 can be labelled as "*travel pleasure addicts*".
The *second cluster* is very small, including only 11 persons (1.7%). It is very high on environmental WTP factor, recording the highest willingness to pay for reducing the air pollution and noise, with, respectively, about 23 and 22 €/week (close to 25, superior limit of range). This is more evident taking into account that the average WTP is low in all samples (Table 3) and that in other clusters ranges from 1 to 2 €/week. In addition this group shows a quite low interest in travel pleasure, time saving and the lowest score for mode performance. This cluster is named "*paying ecologists*".
The *third cluster* includes 208 respondents (31.4%) characterized by high scores both on high and low time saving, and a high value of mode performance, where we find the highest score given to importance of speed. For these respondents time is a priority as they give importance to high time savings: zero-savings is utterly ignored and even 20% reduction is not considered appealing enough for them. The above factors, both related to time saving, can be seen as a mirror of our current society. In fact, as Illouz (2007) argues, our society is dominated by that particular form of recent economy that is the unbridled and fast capitalism. This economical model determines our behaviours and influences our feelings. The first consequence of a such organized society is the loss of time as the rampant increase of technologies tends to compress our private time. The time saving as well as speed reflect perhaps the frantic rhythm of our modern lives. These individuals can be labelled as "*time addicts*".
The *last group* is made up by 209 individuals (31.5%) revealing the highest value on mode performance, even if this factor is quite transversal to all the groups. At the same time, the cluster shows the lowest importance of time saving, environmental WTP, and mode pleasure and nearly the lowest value of travel pleasure. These individuals manifest a marked lack of interest towards travelling in general and look forward to a mode offering the most on comfort and speed just to reach the destination. The lack of specific interest in their trips, undertaken mainly out of necessity, makes them "*timeservers*".

5. Discussion on psychographic profiles: socio-demographic characteristics and travel intentions

The clusters defined in section 4 highlight specific psychographic profiles and, to understand their intrinsic nature, it is important to analyse them using the socio-demographic characteristics of the respondents, but also the other attitudinal variables not used in the EFA, due to their categorical nature. This will help to assess the inclination to changing mode, geared to the ultimate goal of supporting decision-makers in setting up proper and efficient policies, more tailored to the users' profile than to the traditional distinction between car users and public transport users.

5.1 The socio-demographic characteristics

In table 5 the socio-demographic characteristics of the four clusters are summarized. Parametric and non parametric methods to test for dissimilarities between the groups of respondents were chosen, adopting t-test and the Kruskal–Wallis test to investigate eventual differences among the groups of

interviewees, according to their individual characteristics.
The analysis showed that gender, family size and income are irrelevant indicators in respect to clusters' difference, while age and education show differences between cluster 1 (travel pleasure addicts) and 3 (time addicts), and occupation proves meaningful between groups 1 and 4 (timeservers).
Table 5 allows us to observe that *travel pleasure addicts* (cluster 1) are younger (57% of persons being less than 40 years old and only 11.8% over 60), with a medium-high level of education (90%), compared with *time addicts* (cluster 3), while those show the highest percentage of over 60s and of low-educated people (15.9% primary school). Car ownership also differs between cluster 1 and 3 where this last group shows the highest percentage of non car owners (18.7%). According to Kuhnimhof et al. (2006), what appears interesting is the role played by educational levels in distinguishing the clusters, making those levels and, likewise the attitudes, appear as a determinant in modal choice. In fact, even if *time addicts* reveal the lowest cars ownership, they use car more than cluster 1, respectively 52.3% versus 40.1% (Table 6), and no difference in car use as an alternative mode is recorded (both about 50%).
Considering occupation in general, cluster 1 and 4 (*timeservers*) display a similar percentage of employed people, respectively 63.3% and 60.2%. However, the occupation typology is statistically different between the two groups. In fact, within the employed people, the main difference concerns the percentage of "workers", twice as many in *timeservers* (cluster 4), and the percentage of managers and others, much higher in *travel pleasure addicts* (cluster 1). The unemployed persons (students and retired/housewives) are, respectively, three times as many, and half as many in cluster 1, vis-a-vis cluster 4.
According to Anable results (2005, p.71), "attitudes and opinions seem largely cut uniformly across demographic characteristics" as variables traditionally considered significant (income and family size) are not determinant of attitudes, and the other variables listed above play a role only in differentiating some clusters, but are not transversal to all.

5.2 The travel behaviour and intentions

To understand if modal diversion is an attainable goal, the first issue to be considered is the most often revealed travel behaviour within the clusters and the extent group members are inclined to use alternative modes. The questionnaire contained some specific demands aimed at testing this attitude through categorical variables. In Table 6 these variables, and likewise the behavioural variables regarding the mode used for the most frequent trip, are reported with the related responses. The Kruskal–Wallis test shows a significant difference in terms of the mode used ($p = 0.024$) between the clusters 1 and 4 and between 3 and 4. The *travel pleasure addicts* (cluster 1) show a greater reliance on the train in respect to the other modes (30.2%), even if car is the most used mode (40.1%), transversal to all the clusters, with peaks for *timeservers* (cluster 4) and *paying ecologists* (cluster 2) (65.5% and 70%, respectively). The trip duration also differs between *travel pleasure addicts* (45 minutes) and the other groups (paying ecologists: 23 minutes, $p = 0.0028$; time addicts: 29 minutes, $p = 0.0000$; timeservers: 30 minutes, $p = 0.0001$), probably related to the greater use of train.
The purpose of the most frequent trip does not show any difference between clusters 1 (*travel pleasure addicts*) and 4 (*timeservers*), even if the modes used are significantly different. On the other hand, where the modes did not reveal statistical difference between *travel pleasure addicts* (cluster 1) and *time addicts* (cluster 3), the trip scope was varied as the time addicts show higher percentage in shopping/errand/leisure.
This result is quite interesting showing a decoupling between mode and purpose. In fact, we can observe that, for the same purpose, people can choose different modes, both car and public transport, the constraint not being the purpose itself (work or shopping/leisure), but their own attitudes towards the travel. It is interesting to note how the *time addicts* (cluster 3) use the car more often than *travel pleasure addicts* do, even if they make up the greatest percentage of people not

owning a car and travelling for shopping/leisure. The reason lays on their attitude to give high importance to time saving, being always in a hurry, even if they form the cluster with the highest percentage of old-age people (30.4% over 60 years).
Concerning attitudinal variables, Kruskal-Wallis test shows a statistical difference between *travel pleasure addicts* (cluster 1) and *timeservers* (cluster 4) in terms of car sharing propensity. However, the disposition towards a higher use of bike where segregated cycle paths are available, as well as the alternative mode used in the most frequent trip, have not emerged as statistically significant among the clusters. In fact, as Table 6 shows, the most used alternative mode is again the car, ranging from about 50% of cluster 1 and 3 to 60% of clusters 2 and 4. The dominant role of car is undisputable, making more difficult a modal diversion towards more sustainable modes. However, the modal alternative chosen for the most frequent trip could help in understanding if changing behaviour is potentially feasible, if some constraints, as well as habits, were weaker.
In fact, the respondents who expressed the highest disposition to increase the use of the bike in case of cycle paths availability, are those who already use the car less (*travel pleasure addicts*); instead the car-dependant people – as *paying ecologists* (cluster 2) and *timeservers* (cluster 4) – are also those less willing to abandon it and declaring weaker attitudes towards a modal diversion. The *time addicts* (cluster 3) rely more on the bus as an alternative mode, and their behavioural intention of increasing bus usage as alternative option to the car is consistent with their current behaviour. This means that they are likely to be shifted to public transport if bus were time-reliable as a metro system is, due to their strong orientation to time saving. In this case, the context is very important as public transport in the studied city records a poor quality of service and a limited transport supply, as in the most part of medium-size Italian cities, reinforcing the habit of using the car. This confirms how attitude and habit play a joint role in determining behaviour. De Pelsmacker and Janssens (2007) showed that, in traffic safety behaviour, both constructs can play a role: habit formation leads to 'automatic' or learned behaviour, while (lack of) perceived behavioural control (PBC) is a cognitive factor that may deliberately lead to a certain behaviour. Moreover, as suggested by Triandis (1977), there is a trade-off between attitude and habit in the prediction of behaviour: when habit is strong the attitude-behaviour relation is weak, whereas when habit is weak, the attitude-behaviour link is strong.
Considering the attitude on time saving, the *time addicts* (cluster 3) surprisingly express the lowest percentage in giving an economic advantage to time saving as well as assigning the lowest monetary value both to the 20% monthly travel time reduction and to one hour of spare-time. They are, together with *timeservers*, statistically different in their attitude towards the time saving and time value, feeling less sensitive to the potential monetary advantage in respect to the *travel pleasure addicts*.
In regard to environmental attitudes, the difference between *travel pleasure addicts* and *time addicts*, as well as with *timeservers*, emerges again, highlighting a low interest for the "initiative of Sunday on foot" (cars banned from access to the city centre) for the last two groups. The limited environmental sensitivity is also fully confirmed by the response given to the degree of environmental concern, that is the lowest for cluster 3 and 4 and the highest for cluster 1 and 2. Even if the *paying ecologists* (cluster 2) feel the importance of the environment and are willing to pay to preserve it, they do not seem ready to change habits and abandon the car, embracing the "polluter pays" principle. They represent a minority in the sample and, while displaying different general attitudes in terms of environmental WTP, they show similar behavioural patterns to cluster 3 (time addicts) and 4 (timeservers), being the most passionate car users.
However, the most difficult group to shift to more sustainable modes is, of course, that of *time addicts* as they are not predisposed to alternative modes, thinking that their car is the most comfortable and fastest mode and the only thing they are interested on is the arrival to destination.
Comparing information from Table 6 and Figure 1 is possible to observe some relationships between behaviour and attitude. People in cluster 2 are conscious about the pollution they cause and show a willingness to pay for continuing to use the car instead of other modes, namely, public

transport. This happens independently from trip purpose, as their strong habit in using car and their low attitude to shift away from it, using alternative modes, cut across the purpose (work 54.5%, study 9.1%, and leisure 36.4%). The same behavioural intentions regarding the "*no change the car use"* are recorded in cluster 4, showing also a low interest in travel and mode pleasure. Even if quite similar to cluster 1 (*travel pleasure addicts*) in terms of travel purpose (Table 6), they are less inclined to travel pleasure and their behavioural intentions are quite different, showing a higher rigidity and low attitude towards modal diversion and environmental concern, and not inclination to change. It can be argued that a better predictor of behaviour is the behavioural intention, as demonstrated by Ajzen (1985, 1991), Fishbein and Ajzen (1975), and Gärling et al. (1998), since it does not express only the desire to act, but also the commitment to act.
Again, it is not the purpose that influences behaviour, but the attitudes and the behavioural intentions towards travel. This leads us to think that they will hardly shift to more sustainable modes, according to the outcome of Fujii and Gärling (2003). They noticed in their experiment that prediction is more accurate if it is based on a stated intention not to "perform the behaviour" and it is much lower if based on an intention to "perform the behaviour", while, if habit to perform an alternative behaviour intervenes, the predictive accuracy may decrease even further.

6. Discussion and conclusions

Analyses prove that the *travel pleasure addicts* (cluster 1) manifest the highest attitude to change mode while *time addicts* (cluster 3) and *timeservers* (cluster 4) display the highest dependence on the car, and low intention to use alternative modes. The *travel pleasure addicts* manifest such a satisfaction for travelling and mode performance, that they could be shifted to public transport if it was substantially improved in its efficiency. In fact, 30% of them already use the train, enjoying the service, the association with the landscape, as well as the possibility of undertaking other activities while travelling. In addition, they could be easily shifted from car to alternative modes should these guarantee time saving to which they grant the highest value.
The clusters description shows also a confirmation of the hypothesis set up in our methodological approach (section 3). In fact, in our study we focused on the most frequent trip, not considering its purpose, and the above results show that the same attitudes (car use and low-null modal diversion intention) are recorded in people with different travel purposes, reflecting a resistance to change behaviour in terms of car use, partly because of habit.
The analysis shows a difference, in terms of mode, only between cluster 1 (*travel pleasure addicts*) and 3 and 4 (*time addicts* and *timeservers*), due to a greater reliance of train by *travel pleasure addicts*, even if all the clusters reveal that the majority of components use the car. However, the motivations to use the car are quite different. The car is often the most convenient way to satisfy users' needs and time limitations, even if certain individuals display a more favourable attitude to modal diversion; other times the car is preferred for the intrinsic pleasure derived from its use, observing in this case a lower disposition towards the use of more sustainable modes.
The TPB posits that the most relevant determinant of behaviour is the intention to perform that behaviour (behavioural intention). In turn, intention is described by three components; attitude, subjective norm and perceived behavioural control. While empirical support for the predictive ability of the TPB in a physical activity domain is evident (e.g. Hagger et al., 2002), current research suggests, nonetheless, that intentional control of behaviour may be more limited than the TPB assumes. For example, habit strength has been found to moderate the intention-behaviour relationship such as intentions predict behaviour among individuals with weak habits and not among individuals with strong habits (Chatzisarantis and Hagger, 2007). These outcomes are close to our results where habit seems to play a main role in choosing the mode for the most frequent trip, supported also by a lack of perception of immediate and evident negative consequences of their behaviour (unlike physical activity and use of drugs). In fact, users do not often perceive their mobility behaviour as a direct determinant of climate change, as if it were not their responsibility. However, when they become conscious about the cause-effect relationship, they show high

willingness to pay to reduce the damages produced by their unsustainable behaviour. In both cases their environmental belief and, consequently, their behavioural control are weakened. This fact, associated to strong habit, is unlikely to lead to a behavioural change towards more sustainable modes.

Ajzen, (1988), in his principle of compatibility, declares that we can expect a strong attitude-behaviour correlation if the measures of attitude and behaviour involve exactly the same action, target, context, and time elements. Ajzen and Cote (2008) add also that global attitudes fail to predict specific behaviours because they are too general to be relevant for a specific performance, even if they are strong. This approach finds confirmation in our results; in fact, the *paying ecologists* (cluster 2) show a pro-environment attitude through both a high environmental concern and WTP to reduce air and noise pollution due to transport (general attitudes); but their behaviour is strongly geared to car use.

Eagly and Chaiken (1993) suggested that the relation attitude-behaviour can be weakened by correlated factors of attitude strength as certainty, amount of knowledge, or the temporal stability of one's attitude. Observing the paying ecologists' specific attitudes towards the mode used in the most frequent trip, a low interest in travel pleasure as well in the performance of the mode they use is recorded. This means that, for this small group, there are not social and affective motives for car use, as found by Steg (2005), but the use of car is mainly due to functional reasons and the low performance of public transport. If we add the strong habit in using car, all these factors contribute to weaken the relation attitude-behaviour. This is fully confirmed by the mode used for the most frequent trip, that is never the bus or the train (0%), and from the stated attitude about the use of public transport, even if it was free of charge (60%). This also explains well their strong willingness to pay for reducing pollution because, even if they are conscious about the environmental damage of the car use (general attitude), they are not prone to change mode, and, consequently, their habits. Thus, the lack of a positive attitude towards the modal diversion is balanced by a clear willingness to pay for their conscious polluting behaviour (internalising the "user pays" and "polluter pays" principles), and their environmental concern does not induce a "virtuous" behaviour in terms of modal choice, but encourages them to pay for maintaining their "bad habits", giving a justification to the mismatch with their moral norms.

We can argue that an efficient alternative to the car could move them to shift, moreover as 20% already use the train as an alternative mode. However, to reinforce the use of this alternative mode as main mode, the increase of transport efficiency is not enough and three elements should be considered: a detailed action planning, a perceived self-efficacy, and an action control. In fact a strong motivation and self-control can trigger the general positive attitude towards the environment. As argued by Poortinga et al. (2004), the socio-demographic and household variables are more influential on environmental behaviour than the environmental beliefs, and Hunecke et al. (2010) add that "behaviour specific attitudes and beliefs are better predictors of behaviours than values or general environmental concerns". This leads to think that a modal diversion could only happen if the certainty and the amount of knowledge about the car efficiency, linked to the strong habit acquired over time, would be overcome by policies focused to increase the efficiency as well as the knowledge of alternative modes through adequate information about their performance and positive effects on the environment. An educational policy – showing that it is not sufficient to pay to improve the environment, but that changing habits could convey personal and general benefits alike – could trigger the positive behavioural intention to increase the use of bike and bus (40%) and the commitment to act in a different way, consistent with their general beliefs, strengthening, as a consequence, their behavioural control. This could be extended also to other groups where the general attitudes reveal a wider potential for modal diversion, that could be realised only overcoming the contingent situation of low quality public transport and limited cycle paths availability, providing evidence of the importance of the context and of the social environment to improve the attitude-behaviour correlation.

Harland and Wilke (1999) affirm that moral norms stem from environmental concern and knowledge. Our research shows that the moral norms have no strong bearing on the respondents. Arguably, this difference, also in respect to Anable findings (2005), is due to the diverse cultural backgrounds and habits of UK versus Italy, where the sensitiveness for the environment is still not broadly shared. A general evidence comes out from literature (European Commission, 2005; Korfiatis et al., 2004; Wright and Klÿn, 1998) in terms of social differences between the Northern and Southern European countries, namely in terms of their compliance with the rules or the concern for the environment. Steg and Gifford (2005) highlight important differences between North America and the Netherlands as regards car dependency (i.e., the level of car use, car oriented land use and quality of travel alternatives), much higher overseas. They also argue that the above differences can emerge when comparing regions within a country.

The above low attention towards the environment, joined to the already mentioned poor quality of public transport supply in medium-size cities, does not favour a pro-environment behaviour unless major trade-offs are accepted in terms of trip efficiency.

This supports Ajzen' argument that general attitudes are rarely related to behaviour as the specific choice constraints (e.g. poor transport supply) play a big role in breaking up the relationship attitude-behaviour. In fact, the public transport supply, insufficient for the users' needs, is an important constraint in modal shift and it is probably one of the main causes hindering the development of a pro-environment behaviour.

The environmental behaviour differences between our results and literature evidence show how both the geographical and spatial context (medium size city), as well as the social context could be significant in conditioning behaviour. As hinted in section 2, an abundant literature comes mainly from the U.S, with some studies in UK and northern Europe, with just one example coming from Greece, but focussed on personal traits of car drivers. Thus, there are not any studies in southern Europe concerning the market segmentation based on attitudes and there is scarce knowledge about the eventual influence of geographical location on people behaviour. In fact, this could have some implications in terms of culture, habits, climate, as well the characteristics of public transport supply, observed as an important constraint in modal choice. Some discordant results about the moral norms and related behaviour show how the cultural background and the habits of a population can lead to a slackening of the tie between them and how other surrogate attitudes (e.g. willingness to pay) are found to justify this mismatch. These initial results provide the basis for further research to the extent culture and education can influence the transport users' behaviour, and the convenience of providing proper education on mobility to influence in a positive way their behaviour. We recommend this issue should be further investigated to present decision makers with more policy instruments to add on to the more traditional, but necessary, interventions on the transport supply and mobility management.

Another interesting finding concerns the car dependency that, here, is related more to necessity than to pleasure. In fact, the *travel pleasure addicts* manifest a real pleasure for the mode they use, whatever it is (car, train, bus, bike, foot), and the great enjoyment they declare is for the travel itself. This implies a certain flexibility to use any mode allowing them to enjoy the pleasures of freedom, discovery and adventure. This fact confirms what other researchers have found (Mokhtarian and Salomon, 2001) about travelling for its own sake, something valid for the most frequent trip and not only for undirected travels. The difference between the profiles of public transport users and car users, as found by Jensen (1999), does not emerge here, as the car cuts across the mobility habits, and users' emotions towards travelling are the most important discriminating factors amongst groups. This is confirmed also by the variable forming the factor 1 (travel pleasure) that measures the personality trait towards travelling (from "preference to stay at home" to "liking of adventure travels", as in Table 1). The results show that *time addicts* and *timeservers* (cluster 3 and 4) are much more sedentary than the other two clusters and that cluster 1 (*travel pleasure addicts*) components are those people fonder of travelling to know new places and loving adventure travels.

Definitely, *travel pleasure addicts* appear to be statistically different from 3 (*time addicts*) and 4 (*timeservers*) under several attitudinal variables.
The *timeservers* are the cluster representing people showing the biggest difficulties to shift to more sustainable modes; these individuals could be compared to the sluggish (as in the Dante's Inferno) and their "conversion" could pass through a sensitization about the car costs, in terms of direct and indirect ones (health and quality of life) to overcome their indifference and passivity in choosing the car as the most obvious mode.
What clearly emerges from our research is the marked significance of identifying psychographic profiles in helping decision makers to plan for a more sustainable mobility, tested on the population and on its specific living context. The identified clusters show that some people snub any well known and accepted transport policy, while in other clusters, *as travel pleasure addicts*, people seem more inclined to change. Policy makers should concentrate on this last group and act to remove obstacles in transport supply. In fact, our study shows how significant are constraints as necessity, time saving, and low transport supply in determining a behavioural change, so that the "right general attitudes" are not sufficient to obtain a real modal shift in medium-size cities where public transport is not well developed and mainly designed around students going to school.
The market segmentation leads to suggest the following practical policy options:

- to invest money in improving public transport quality in the medium-size cities, as well as cycle paths, in order to prompt travellers to use them. Decision makers should mainly focus on quality and image of public transport to attract also the *timeservers* who choose the most useful opportunity and will hardly abandon their car if not properly informed and stimulated;
- to make private transport more uncomfortable and expensive, introducing strong restrictions on parking (reducing parking places) and increasing its cost, prompting car users who use it both for its own sake and without further interest, to shift modes. This is also showed in a previous study by Mackett and Edwards (1998) who analysed seventeen public transport systems (mainly light rail) and recorded a general overestimation of potential new users, confirming that the introduction of a high quality public transport does not guarantee a significant modal diversion, if a proper policy for reducing car use is not adopted;
- further on the "traditional" options described, an important supportive action should be stimulating people attitudes through proper information and advertising about the effects of unsustainable behaviours, to induce them to change their habits, a preliminary step towards behavioural change. Information and advertising could take the shape of an "educational plan", addressed to mobility, that we consider the key issue to induce the change, starting from the young generations. They are the at grassroots to reach a future collective and social consciousness, forming the culture and attitudes of a population, but they are also those who more clearly perceive the social expectations having a stronger influence than habit on the intention of using the car (Bamberg and Schmidt, 2003). It emerged from our study that young people (such as students) show more sustainable behaviours as well as a more positive attitude to modal change. On this basis, a cultural-oriented approach, tailored to the different characteristics of people living in a country, but even in a region within the same country, seems relevant.

The real trade-off lies between the cost for improving the public transport supply and the number of users that could change behaviour. Such trade-off should be compared with what could be obtained on the basis of an "educational plan", that is much less costly. This is a challenge for the above mentioned urban contexts where "network effect" is hardly reachable using fast modes as metro, but could be attained through an efficient re-organization of traditional bus services and, if possible, introducing light rail services. Where financial resources do not allow to intervene in a structural way, a "soft" alternative approach based on improving education on mobility could be helpful. A research on the effect of an educational programme on changing mobility patterns would be useful and probably promising, judging upon the results of our study. In fact, the importance of the educational level has emerged as the sole socio-economic and demographic characteristic, together with age, able to distinguish the clusters and to influence people attitudes.

An effective educational programme could help Europe to make their citizens more attentive to the consequences of their behaviours and, hence, more receptive to the EU policies. In fact, considering the policy approach, the EU Green Paper "Towards a new culture for urban mobility" (2007) identifies five challenges in urban mobility, namely progressing towards: free-flowing towns and cities; greener towns and cities; smarter urban transport; accessible urban transport; safe and secure urban transport. These challenges are definitely hard to manage and we think that a smoother and more sustainable mobility should pass through a deeper insight into the motivation of users' choices and their segmentation. This segmentation should be done on attitudes and not on mode and purpose, because what makes travellers similar are their needs and constraints, not necessarily the mode used or the travel purpose. In fact, they can show different attitudes and use the same mode (e.g. car), because the mode satisfying their needs does not exist or it is not of good quality. On the other hand, they can have the same trip purpose, but use different modes and, again, the attitudes are the real discriminating factor among the groups.

However, in case of modal shift, the attitudes will lead to a real behavioural change if policy makers are able to tailor the transport policies both to the large urban contexts and to medium-size cities. In fact, while in big cities the transport supply has generally a quality ranging from sufficient to good, the case is different in smaller cities where a network approach is normally not implemented, due to its high cost compared to the relatively low demand. In the city of Alessandria, analysed in this study, the current public transport supply as well as all other modes alternative to the motor car are quite poor. They should be more suited to users' needs and supported by educational policies to make citizens "better transport users", well aware about the effects of their behaviour. This last point is of course the most interesting as well as the less expensive; in fact, today's transport policies are dominated by infrastructural interventions and economic measures (e.g. pricing), while "soft" policies (cultural and educational) are rarely prioritised, even in big cities. As Bamberg and Schmidt(2003, p. 281) also found in their study, the "economic approach does not take into account soft social incentives as social support" or as expression of a desired social role and we think that in our globalized world these are key issues for a real progress towards a more sustainable mobility.

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Table 1 – The Analysed Variables

Variable number	Variable name	Description of the variables	Range of values
Variables regarding the specific attitude towards the mode used in the commuting trip			
20	modefast	I feel it is the fastest and more adequate mode	Judgment on the statement, expressed by a score from 0 (total disagreement) to 10 (total agreement)
21	modecomf	I feel myself more free and comfortable as regards to the other modes	
22	modeland	I like the connection with landscape it allows	
23	modesake	I like driving , going by car (car) / I do not like driving and I prefer the train/bus (train/bus) / I use this mode to be in form (bike, foot)	
24	mode_env	I use this mode to respect the environment	
25	modejdest	The most important thing is to arrive to destination with the used mode	
Variables regarding the general attitude towards the trip, defined by the statement " I usually move to: ... "			
45	newplace	... visit new places	Judgment on the statement, expressed by a score from 0 (total disagreement) to 10 (total agreement)
46	newroute	... experiment different alternative routes to arrive to the same destination	
47	funofit	... for the pure liking of travelling	
49	relax	... relax	
50	thinkal	... think, to meditate and to enjoy the loneliness	
Variables regarding the general attitude towards the importance of some trip's characteristics			
51	speed	Importance of travel speed	Judgment on the importance given to the characteristic, expressed from 0 (not important at all) to 10 (very important)
52	cost	Importance of travel cost	
53	comfort	Importance of travel comfort	
54	landscap	Importance of the pleasantness of the route scenery	
55	doactiv	Importance of doing activities during the trip (e.g. reading, listening music, etc.)	
Variables regarding the personality traits			
57	behav	Statement linked to users' personality (e.g. preference to stay at home, travel for need, travel to look for new or other places, etc.)	Judgment from 0 (preference to stay at home) to 5 (liking of adventure travel)
Variables regarding the specific attitude towards time saving in the most frequent trip, defined by the question: "Concerning your most frequent trip, which is your degree of satisfaction/pleasure in saving …% of travel time ?"			
67	notimred	no travel time reduction	Judgment on the statement, expressed by a score from 0 (worst) to 10 (best)
68	timred10	10% travel time reduction	
69	timred20	20% travel time reduction	
70	timred30	30% travel time reduction	
71	timred40	40% travel time reduction	
72	timred50	50% travel time reduction	
73	timrem50	more than 50% travel time reduction	
Variables regarding the general attitude towards the willingness to pay (WTP)			
77	wtpairpe	WTP to reduce air pollution by 30% (€/week)	from 0 € to 25 €
79	wtpnoise	WTP to reduce noise by 30% (€/week)	from 0 € to 25 €
98	wtpaccw	WTP per access to the city centre in case of road pricing (€/week)	from 0 € to 21 €

Table 2 – Rotated Factor Loadings (Pattern)

		Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6
Variable number*	**Variable name***	**Travel pleasure**	**High time saving desirability**	**Environmental WTP**	**Low time saving desirability**	**Mode performance**	**Mode pleasure**
20	**modefast**	-0.064	-0.078	0.045	0.037	**0.687**	0.070
21	**modecomf**	-0.029	-0.039	0.064	-0.005	**0.554**	0.013
22	**modeland**	0.043	0.009	0.020	0.012	0.093	**0.746**
23	**modesake**	0.018	-0.030	0.074	0.016	**0.343**	**0.426**
24	**mode_env**	0.051	0.032	-0.055	0.012	-0.077	**0.559**
25	**modejdes**	0.012	0.021	-0.035	0.029	**0.344**	0.105
45	**newplace**	**0.665**	-0.073	0.020	0.015	0.165	-0.187
46	**newroute**	**0.742**	-0.015	0.002	-0.051	-0.112	0.073
47	**funofit**	**0.820**	-0.055	0.020	0.024	-0.070	0.011
49	**relax**	**0.737**	0.063	0.017	-0.053	-0.062	0.103
50	**thinkal**	**0.718**	-0.013	-0.017	-0.062	-0.071	0.118
51	**speed**	0.085	-0.039	-0.129	0.046	**0.380**	-0.196
52	**cost**	0.054	0.091	-0.280	-0.031	0.158	-0.087
53	**comfort**	-0.045	0.052	-0.052	-0.057	0.281	-0.028
54	**landscap**	**0.364**	0.162	-0.075	-0.079	0.158	0.080
55	**doactiv**	**0.415**	0.007	-0.113	0.137	-0.116	0.118
57	**behav**	**0.643**	-0.062	0.113	0.128	0.062	-0.162
67	**notimred**	0.076	-0.096	-0.060	**0.636**	0.010	0.021
68	**timred10**	-0.036	0.028	0.025	**0.884**	0.015	-0.044
69	**timred20**	-0.039	**0.319**	0.048	**0.657**	0.037	0.015
70	**timred30**	-0.063	**0.609**	0.025	**0.374**	-0.042	0.061
71	**timred40**	-0.052	**0.802**	0.002	0.148	-0.033	0.083
72	**timred50**	0.030	**0.895**	-0.071	-0.091	-0.008	-0.011
73	**timrem50**	0.016	**0.678**	0.059	-0.059	-0.016	-0.058
77	**wtpairpe**	0.034	0.034	**0.950**	-0.017	0.049	-0.039
79	**wtpnoise**	-0.002	0.034	**0.945**	-0.002	0.012	-0.001
98	**wtpaccw**	0.278	0.076	0.267	-0.065	0.028	-0.067
	VP	3.559	2.460	2.030	1.857	1.381	1.248

** as in table 1*

Table 3 – Responses to the attitudinal variables an personality traits

Factor	Variable number*	Variable name*	Median/Mean	Range of values
Factor 1 Travel pleasure	**47**	funofit	4.0	0-10 0-5 (behav)
	46	newroute	2.0	
	49	relax	6.0	
	50	thinkal	3.0	
	45	newplace	8.0	
	57	behav	3.0	
	55	doactiv	2.0	
	54	landscap	8.0	
Factor 2 High time saving desirability	**73**	timrem50	10.0	0-10
	72	timred50	8.0	
	71	timred40	7.0	
	70	timred30	5.0	
Factor 3 Environmental WTP	**77**	wtpairpe	2.55	0 € to 25 €
	79	wtpnoise	2.07	
Factor 4 Low time saving desirability	**67**	notimred	0.0	0-10
	68	timred10	0.0	
	69	timred20	2.5	
Factor 5 Mode performance	**20**	modefast	9.0	0-10
	21	modecomf	9.0	
	51	speed	8.0	
	25	modejdest	8.0	
Factor 6 Mode pleasure	**22**	modeland	5.0	0-10
	24	mode_env	4.9	
	23	modesake	7.0	

** as in table 1*

Table 4 – Cluster means and standard deviation, F-like-ratio and pooled within cluster covariances and correlations

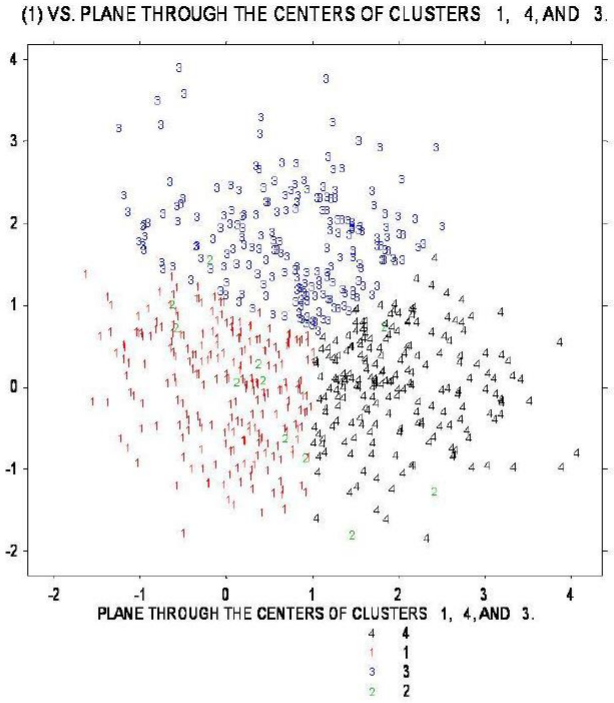
CLUSTER	MEANS	Factor 1 Travel pleasure	Factor 2 High time saving desirability	Factor 3 Environmental WTP	Factor 4 Low time saving desirability	Factor 5 Mode performance	Factor 6 Mode pleasure
	SIZE	**travpl**	**htimsdes**	**WTP_env**	**ltimsdes**	**modeperf**	**modepl**
1: Travel pleasure addicts	235	50.7064	29.4553	5.4447	3.4723	32.4170	16.8117
2: Paying ecologists	11	21.7273	23.9091	45.4545	3.2727	27.4000	14.5000
3: Time addicts	208	28.0433	33.4663	3.4441	9.4952	32.3646	14.4531
4: Timeservers	209	24.3110	23.8660	2.1579	1.5742	33.0410	12.7179
GRAND MEAN		34.7949	28.8597	4.4448	4.7602	32.5161	14.7564
CLUSTER	**STANDARD DEVIATION**						
		travpl	**htimsdes**	**WTP_env**	**ltimsdes**	**modeperf**	**modepl**
1: Travel pleasure addicts		8.8898	4.5500	5.6754	3.3959	3.8003	5.1448
2: Paying ecologists		10.2087	8.4552	8.2020	3.1652	8.6436	6.0599
3: Time addicts		12.7992	3.8809	4.4993	5.0610	5.0123	6.2978
4: Timeservers		12.4211	5.8901	3.7047	2.1917	5.2767	6.0605
MEAN SQUARES		**travpl**	**htimsdes**	**WTP_env**	**ltimsdes**	**modeperf**	**modepl**
BETWEEN		31275.900	3326.255	6678.701	2399.672	107.353	590.188
WITHIN		129.797	24.117	23.149	13.809	22.855	33.941
D.F.-S		3,659	3,659	3,659	3,659	3,616	3,616
F-RATIO		*240.960*	*137.921*	*288.510*	*173.781*	*4.697*	*17.389*
P-VALUE		0.000	0.000	0.000	0.000	0.003	0.000

Table 5 – Socio-Demographic And Economic Characteristics Of Each Cluster

		Cluster 1 *Travel pleasure addicts (%)*	**Cluster 2** *Paying ecologists (%)*	**Cluster 3** *Time addicts (%)*	**Cluster 4** *Timeservers (%)*
		%	%	%	%
Cluster size		235 (35.4%)	11(1.7%)	208(31.4%)	209(31.5%)
Gender	Male	46.0	36.4	41.6	44.7
	Female	54.0	63.6	58.4	55.3
Age	18 to 25 years	15.2	9.1	8.4	8.3
	26 to 40 years	41.8	18.2	22.4	20.6
	41 to 60 years	31.2	54.5	38.8	49.1
	over 60 years	11.8	18.2	30.4	21.9
Education	Primary school	1.3	0.0	15.9	14.9
	Secondary school	8.4	36.4	22.0	27.6
	High school	67.9	54.5	48.6	49.6
	University degree	22.4	9.1	13.6	7.9
Occupation	Worker	5.1	0.0	5.6	10.1
	White collar	21.5	36.4	18.7	22.8
	Retired/housewife	15.2	9.1	37.9	32.5
	Student	21.5	9.1	9.3	7.5
	Manager	1.7	0.0	0.5	0.9
	Self-employed worker	11.8	9.1	13.1	11
	Others	23.2	36.4	15	15.4
Income	0 €/month	0.4	0	0.5	0.4
	less than 1000 €/month	22.4	18.2	22.4	21.9
	1,000 to 3,000 €/month	49.4	63.6	59.3	61.8
	3,000 to 4,500 €/month	21.9	9.1	15.4	12.3
	> 4,500 €/month	5.9	9.1	2.3	3.5
Family size	1	12.7	9.1	14.5	9.2
	2	19.8	9.1	28.0	24.6
	3	34.6	54.5	27.1	36.4
	4	27.8	18.2	25.2	23.7
	> 4	5.0	9.1	5.1	6.1
Owned cars	0	5.5	9.1	18.7	11.8
	1	22.8	27.3	20.1	47.8
	2	48.5	54.5	42.5	17.1
	3	16.0	9.1	12.1	2.6
	> 3	7.1	0.0	6.5	0.0

Table 6 – Behavioural And Attitudinal Characteristics Of Each Cluster (in % or Euros)

		Cluster 1 *Travel pleasure addicts (%)*	**Cluster 2** *Paying ecologists (%)*	**Cluster 3** *Time addicts (%)*	**Cluster 4** *Timeservers (%)*
Cluster size		35.4	1.7	31.4	31.5
Behavioural characteristics					
Most frequent trip mode	Car driver	36.9	50	46.6	61.9
	Car passenger	3.2	20	5.7	3.6
	train	30.2	0	10.5	11.2
	bus	4.5	0	4.7	3.0
	bike	5.9	10	9.4	3.0
	foot	18.9	20	22.5	16.8
Alternative mode	Car driver	44.6	40.0	37.5	52.0
	Car passenger	5.8	20.0	13.0	8.0
	train	21.9	20.0	9.9	10.5
	bus	0.0	0.0	16.1	11.0
	bike	3.6	10.0	9.4	5.5
	foot	0.0	0.0	11.5	8.5
	motorbike	10.0	10.0	2.6	4.5
Most frequent trip purpose	Work	55.8	54.5	47.3	58.1
	Study	24.0	9.1	10.1	24.8
	Shop/leisure	20.2	36.4	42.5	17.1
Most frequent trip duration	minutes	45	23	29	30.5
Attitudinal characteristics					
Car sharing	Share car free of charge	78.9	40	65.3	50
	Share car if economic advantage	2.2	0.0	6.9	4.6
	Not share car	18.9	60	27.7	45.4
If free public transport	No more car	8.9	0.0	7.9	10.0
	Still car, but + bus	65.6	40.0	53.5	42.3
	No change the car use	25.6	60.0	38.6	47.7
If more cycle paths	Always bike	8.9	0.0	7.9	10.0
	Increase use of bike	65.6	40.0	53.5	42.3
	No change the car use	25.6	60.0	38.6	47.7
Economic advantage In case of time saving	Yes	90.7	81.8	68.7	69.7
	No	9.3	18.2	31.3	30.3
Time value for 20% monthly travel time reduction	Euros	21.9	15.4	15.2	16.2
If 20% above saving time used as free time, which value ?	Euros	26.3	17.1	18.1	19.2
Value of 1 hour free time	Euros	26.7	25.8	18.5	20.7
Sunday on foot	Not useful	4.6	0.0	9.3	17.1
	Useful, but not comfortable	18.1	9.1	17.8	28.1
	Useful and pleasant	77.2	90.9	72.9	54.8
Environmental concern	None	0.8	9.1	0.0	5.7
	Little	3.4	0.0	68.7	12.3
	Sufficient	47.3	18.2	31.3	50.9
	Much	32.9	63.6	0.0	23.2
	Very much	15.6	9.1	0.0	7.9



		Travel pleasure addicts	*Paying ecologists*	*Time addicts*	*Timeservers*
		Cluster 1	Cluster 2	Cluster 3	Cluster 4
Factor 1	WTP_env				
Factor 2	travpl				
Factor 3	ltimsdes				
Factor 4	htimsdes				
Factor 5	modepl				
Factor 6	modeperf				

Figure 1 – Clusters representation and clusters' profile plot