Deliverable 4.1 Interim Results of Behavioural Analysis and Framework

Executive Summary

General Aspects

It has already been recognised that elasticity can not sufficiently describe what cognitive or motivational processes are behind quantitative changes of consumer behaviour. Therefore it is important to include psychological aspects, as they are necessary to understand and predict user reactions towards differentiated pricing and thus to manage demand.

The general objective of this report is to impart knowledge about psychological constraints of user reaction towards differentiated pricing. In detail, this report will

- give a review of identified psychological factors, which influence consumers´ perception, understanding and evaluation of differentiated pricing and their behavioural response to that;
- analyse existing theoretical and empirical knowledge about these psychological factors and synthesise them into a heuristic model of how they affect user response;
- formulate hypotheses about the degree of differentiation that people are able to understand and to respond to, and the psychological factors that determine this degree of differentiation and
- give an outlook on the methodology for assessing and evaluating the possible impacts of these psychological constraints on the interpretation of the results of certain case studies.

Within the theoretical framework an overview of relevant psychological theory is given, describing the relationship between differentiated charges, psychological constraints and behavioural adaptation with the help of the Stimulus-Organism-Response-Model (SOR-Model) of human behaviour. The analysis of theoretical knowledge has identified many potential psychological determinants of user reaction, which can depend on cognitive, motivational, personal or situational factors. All of them are described within this deliverable.

Transport infrastructure use charging

The way in which way transport infrastructure use charges are framed by the government, together with infrastructure owners or operators, influences user responses to transport prices. Therefore it is not just important to consider the price differentiation itself but also to observe the following factors influencing the efficacy of the pricing signal:

(i) modus of payment
(ii) provision of information and advice
(iii) stability of the prices and of the price structure
(iv) enforcement, sanctions and penalties.

Behavioural adaptation

Behavioural adaptation occurs as users respond to changes in the transport system. We have to differentiate between behavioural adaptation that refers to short-term, medium-term or long-term decisions. Thus there are three relevant decision and behaviour levels concerning mobility (e.g. route choice) and driving behaviour (e.g. speed) as well as higher decisions on mobility (e.g. vehicle choice). We see impediments to changes in mobility behaviour on all levels as they are associated with high costs. But if behavioural changes become necessary, an adaptation occurs normally according to the “cost minimization principle” (Loukopoulos, 2005).

Cognitive determinants of price evaluation

Research in cognitive psychology already provides knowledge about the cognitive limits of users faced with a differentiated charging scheme. Thus the perception and the knowledge of prices play an important role for user reaction. Whether people can understand a pricing system and its communication depends on their prior knowledge and experience with principles of differentiated charging in various domains of life. Furthermore there is always the question on psychological costs of behavioural adaptation. The higher these costs are, the less likely a change in travel behaviour as a

reaction to differentiated charging becomes (cognitive comfort). If the differentiation becomes too extensive for individuals to understand, people tend to base their behaviour on a simplified mental model of the price structure, thus use heuristics. Processing a large amount of information is also restricted by people's limited attention and mental capacity to process information.

Motivational Factors

Even if a differentiated charging system is designed in a way that people would be able to understand it, they may not be willing to do so. Therefore apart from the cognitive aspects, a central motivational factor that might influence user reaction toward differentiated pricing is acceptability. Several factors have been identified, which contribute to the acceptability of transport pricing measures (e.g. personal goals, problem perception, perceived effectiveness, perceived fairness, etc.). Furthermore there is a range of other motivational factors, which may have an impact on consumer decision, like for example disengagement or personal involvement.

Personal and situational factors

Inter-individual differences in the ability and willingness of people to deal with extensive information are due in part to cognitive abilities and motivation, but there are also some personal and situational factors that have to be taken into account when analysing consumer reaction to differentiated prices. Therefore user's age, gender, education and income have to be considered when analysing consumer reaction on differentiated prices. People's ability to understand highly differentiated pricing systems depends further on situational aspects such as time pressure and trip purpose.

Theoretical approach

Normally, economic theory would expect a positive relationship (monotonically increasing) between price differentiation and the effectiveness of a price signal. This means that the more differentiated a pricing system is, the more people tend to adjust their behaviour, thus act rationally.

It is clear that people do not always react "rationally" to prices. There are several constraints on behavioural adaptation to differentiated prices which can depend on cognitive, motivational, personal or situational factors. The most important questions are:

- Up to what degree of differentiation are people able and willing to understand and to respond to charging structures?
- Which psychological factors determine the relationship between price differentiation and user reaction?

Within the psychological approach a non-monotonically increasing relationship between the effectiveness of a pricing system (the degree of behavioural adaptation) and the price differentiation is assumed. There is a point, beyond which, the more differentiated a price structure, the less behavioural adaptation will occur. This relationship is in line with the effort people are ready to expend dealing with the new pricing system. This relationship is mainly influenced by cognitive and motivational factors as well as by personal and situational aspects. Evidence so far suggests that cognitive capacities of individuals and the acceptability of the pricing regime play a particularly important role because they constrain ability as well as willingness to process information on highly differentiated pricing systems.

Hypotheses and Methodology

According to the theoretical analysis and the theoretical approach, two categories of hypotheses have been generated: main hypotheses, regarding the relationship between user charges and behavioural adaptation, and sub-hypotheses, concerning determinants, which describe psychological factors that affect behavioural responses on differentiated charges. As there is very little empirical evidence, and since much of that what exists is controversial, it was necessary to supplement research questions to be explored within the DIFFERENT project. Referring to the hypotheses there are clear ideas what kind of data are required for further empirical work within Workpackage 4. But as there is a lack of case studies that include psychological aspects concerning price differentiation and user behaviour, the implementation of a questionnaire survey or of small experiments including some of the missing psychological factors will be required to allow an empirical analysis of the theoretical approach. Thus the proposal is to conduct surveys or experiments based on computer simulations concerning differentiated charging and user reaction, determined by acceptability and understanding.