IMPROVED POLICY SUPPORT THROUGH SEGMENTATION BASED ON SOCIAL ACCEPTANCE

Mario Cools[1,*], Kris Brijs[1,2], Hans Tormans[1], Jessie De Laender[1], Geert Wets[1]

[1] Transportation Research Institute
Hasselt University
Wetenschapspark 5, bus 6
BE-3590 Diepenbeek
Belgium
Fax.: +32(0)11 26 91 99

Mario Cools, Kris Brijs, Hans Tormans, Jessie De Laender, Geert Wets
Tel.: +32(0)11 26 91{31, 29, 37, 31, 58}
Email: {mario.cools, kris.brijs, hans.tormans, geert.wets}@uhasselt.be
Email: jessie.delaender@student.uhasselt.be

[2] XIOS University College
Department of Construction Engineering
Agoralaan – Building H
BE-3590 Diepenbeek
Belgium

Kris Brijs
Tel. : +32(0)11 37 07 77
Email: kris.brijs@xios.be

* Corresponding author

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ABSTRACT

This paper proposes Q-methodology as a technique for the identification of more homogeneous subgroups or 'segments' within a rather heterogeneous overall population when it comes to social acceptance of demand restricting policy measures. Identification of such segments would allow policy makers to better tailor their future actions and thereby increase the chance for a successful implementation of the measures they propose. A set of 33 persons, selected in function of age, gender and car ownership evaluated the acceptability of a total number of 42 demand restricting policy measures. Special care was taken that the final set of statements covered the four classically distinguished demand restricting strategies, i.e., improved transport options, incentives for the use of alternative transport modes, parking and land-use management, and institutional policy revision. In addition, a balance between both 'hard' and 'soft' and 'push' and 'pull' measures was strived for. The results indicate that four different segments in terms of social acceptance of demand restricting policy measures, can be distinguished, i.e., travelers in favor of traffic calming, travelers against hard push measures, travelers in favor of demand restriction, and travelers against policy innovations. Besides the differences and similarities between these segments, the practical implications for policy makers are discussed, together with a series of specific recommendations and suggestions for future research.

1 BACKGROUND

The previous century was characterized by an extraordinary growth in car use that has continued in the current century (*1*). Although car ownership and car use provide clear economic and socio-cognitive benefits, due to the sharp increase in car use, today's society is confronted with various car-related problems causing serious environmental, economic and societal repercussions (*2*). Despite technological innovations and policy interventions, the externalities remain an ecological and social threat that cannot be discarded. Therefore, policy makers should formulate a demand-restricting policy in addition to a demand-following. Notwithstanding, pursuing a demand-restricting policy is a complex task as there are various aspects and interests that need to be taken into account. It is essential for a present day administration, which aspires a sustainable and highly qualitative mobility policy, to focus on users' and residents' needs (*3*).

To pursue efficiency, policy makers should focus on creating a solid social basis for the policy measures considered, as measures that are perceived unacceptable by the general public often miss their target (i.e. reducing car use). Therefore, in this research it will be explored how people evaluate different demand-restricting policy measures. In particular, it will be investigated to what extent people perceive the proposed policy measures in the same way, and whether different segments can be identified according to their assessments. Possible similarities between different segments of people indicate general agreement and pin-point for which policy measures an overall solid social basis exists, or in contrast, for which policy measures public acceptance is completely absent. Furthermore, any eventual differences between segments provide essential information for policy makers, as they allow tailoring policy actions to specific subgroups in order to create the required public support. After all, policy measures will be more efficient and effective if they are fine-tuned on specific target groups, as they can be assumed to better match backgrounds, desires and possibilities of these groups (*4*).

In general, policy measures can be subdivided into four categories: on the one hand, one could distinguish ‘hard’ from ‘soft’ policy measures (*5*). Policy measures considered as ‘hard’ are the provision of transport infrastructure and other physical and/or technical facilities, strict regulation and significant pricing policies (*6*). These policy measures primarily focus on changing behavioral opportunities. ‘Soft’ policy measures include information provision, education and persuasive advertising, aimed at changing norms, motivations and perceptions. On the other hand a distinction can be made between ‘push’ and ‘pull’ measures (*7, 8*). ‘Push’ measures focus on reducing the attractiveness of car use, whereas ‘pull’ measures aim at increasing the attractiveness of alternative transport modes.

In addition, policy measures can be categorized according to their policy domain: engineering, law, economics and education. Table 1 gives an overview of commonly referred categorizations of policy measures corresponding to these policy domains.

Finally, policy measures can be typified according to their policy strategy. The Victoria Transport Policy Institute (*12*) distinguishes four demand-restricting policy strategies: (*i*) improved transport options, (*ii*) incentives to use alternative transport modes, (*iii*) parking and land-use management, and (*iv*) institutional policy revision (policies and programs).

In the following Section, the methodology to explore the evaluation of various demand-restricting policy measures will be discussed. Afterwards, in Sections 3 and 4, the results will be presented and discussed more in detail. Finally, Section 5 will recapitulate the most important findings and pin-point some worthwhile avenues for future research.

TABLE 1 Categorization of Policy Measures According to Their Policy Domain

Policy Domain	Marshall and Banister (*9*)	May et al. (*10*)	Gärling and Schuitema (*11*)
Engineering	Physical measures	Infrastructure provision	Physical change measures
Law	Capacity management Restrictions on access and parking Deliveries of goods and services City and company travel policies Land-use planning	Management and regulation Land-use policies	Legal policies
Economics	Pricing, charging and taxation Subsidies and spending	Pricing	Economic policies
Education	Public awareness Communications and technology	Attitude and behavior Information provision	Information and education

2 Q-METHODOLOGY

To explore the evaluation of various demand-restricting policy measures and define specific target groups, different methodological approaches can be followed including cluster analysis (*13*), factor analysis (*13*), discourse analysis (*14*), Q-methodology (*15, 16*) and correspondence analysis (*17*). In this study, Q-methodology is adopted as the technique to segment people according to their evaluation of different policy measures. The technique is chosen because it does not require a large number of participants in order to generate a diversity of subgroups (*15*), and because it provides a responsive but statistically rigorous approach to study perceptions on sustainable transport policy making (*18*).

Q-methodology is a qualitative yet statistical approach that aims at the systematic and rigorous study of subjectivity, an individual's personal viewpoint, opinion, attitude, and the like. It provides a methodological framework to define discourses (subgroups or segments) which frame people's views on a particular subject, for instance transport policy measures (*15*). Although it is primarily an exploratory technique (the methodology cannot be adopted to formally test hypotheses), it brings coherence to research questions that have many, potentially complex and socially contested answers (*19*).

In a Q-methodological study respondents (P-set) are presented with a set of statements about a particular topic, called the 'Q-sample'. They are asked to rank-order the statements (usually from 'agree' to 'disagree'), a process often referred to as 'Q-sorting' (*20*). By performing this Q-sorting, respondents give their subjective meaning to the statements, and so reveal their personal viewpoints. These viewpoints are then subject to factor analysis (*21*). By correlating respondents, Q-factor analysis gives information about similarities and differences in viewpoints on a particular subject (*18*). If significant clusters of correlation exist, they could be factorized, and described as common viewpoints (or preferences, typologies).

Summarized, Q-methodology encompasses five phases (*21*): (*i*) identification of the areas which one wishes to explore (concourse), (*ii*) development of the statements (Q-sample), (*iii*) selection of the respondents (P-set), (*iv*) rank-ordering by the respondents (Q-sorting), and (*v*) analysis and interpretation. For the basic reference on Q-methodology, the reader is referred to Stephenson (*22*). A good tutorial reference to Q-methodology is written by McKeown and Thomas (*21*).

2.1 Concourse

The first stage in Q-methodology concerns the delineation of the flow of communicability surrounding the areas of interest, often referred to as a 'concourse'. The concourse is a technical concept for the collection of all the possible statements people can make about the subject at hand. The concourse is thus supposed to contain all the relevant aspects of all the discourses (*20*). In this study, the concourse involves statements about the acceptability of various demand-restricting policy measures. Although 'acceptability' can refer to underlying indicators such 'effectiveness', 'fairness' and infringement on someone's 'freedom' (*5*), in this study the focus is laid on the overall concept 'acceptability' to ensure that the respondents give their *overall* subjective meaning to the statements.

2.2 Q-Sample

The second stage implies defining the 'Q-sample', i.e., the set of statements that is presented to the respondents. Watts and Stenner (*19*) indicate that, in general, the use of 40 to 80 statements yields satisfactory results. For this study, the Q-sample contains 42 statements (Table 2). The Q-sample is a structured sample covering the four demand-restricting policy strategies identified by Litman (*23*) and the Victoria Transport Policy Institute (*12*). In addition, it ensured that the distinction between 'hard' and 'soft' policy measures on the one hand, and 'push' and 'pull' on the other is weaved into the Q-sample. The advantage of using a structured sample, is that structured samples are composed systematically, minimizing the risk that some issue components are over- or under-sampled (*21*).

TABLE 2 Q-Sample Statements

Policy measure	n°	Statement	Hard	Soft	Push	Pull
Improved transport options						
Ridesharing	1	It is acceptable to spread travel costs by carpooling.	○	●	○	●
	29	It is unacceptable to ride along with people you got to know trough a carpool-related website.	○	●	○	●
Telework	34	It is acceptable that people are allowed to telework from home.	○	●	○	●
	5	It is acceptable to shop online in order to avoid making a trip to the shop	○	●	○	●
Traffic calming	31	It is acceptable that physical speed reduction measures such as speed humps are installed.	●	○	●	○
	9	It is unacceptable that some roads are closed to avoid through traffic.	●	○	●	○
Transit improvements	35	It is acceptable that trams have separate lanes to prevent from getting stuck in traffic jams.	●	○	○	●
	13	It is acceptable that trams always have right of way over other transport modes such that higher travel speeds can be attained.	●	○	○	●
Alternative work schedules	18	It is acceptable to determine your own working times to a certain degree.	○	●	○	●
	39	It is acceptable that not all employees have to work at the same moment.	○	●	○	●
Car sharing	21	It is acceptable to reserve special parking lots for car sharing.	●	○	○	●

Policy measure	n°	Statement	Hard	Soft	Push	Pull
	40	It is acceptable that people who participate in car sharing do not need to pay all the costs.	●	○	○	●
Cycling improvements	14	It is acceptable that improved bicycle lanes are constructed.	●	○	○	●
	41	It is unacceptable that parking lots nearby train stations are converted into covered bicycle-racks.	●	○	○	●
Park and ride	25	It is acceptable that under-occupied park lots nearby public transit stops are promoted as P&R-parking facilities.	○	●	○	●
Incentives to use alternative transport modes						
HOV Priority	30	It is acceptable that it is prohibited to drive on a separate bus lane with a private car.	●	○	●	○
	2	It is acceptable that public transport has priority at traffic signals.	●	○	○	●
Distance-based taxes	6	It is unacceptable that variable pricing is applied when you drive a car.	●	○	●	○
	19	It is acceptable that you have to pay road taxes according to the distance you travel by car.	●	○	●	○
Fuel taxes	10	It is unacceptable that fuel prices increase.	●	○	●	○
Speed reductions	38	It is acceptable that the speed limit in school zones is 30km/h.	●	○	●	○
	26	It is acceptable that more speed cameras are installed at dangerous locations.	●	○	●	○
Walking and cycling encouragement	15	It is acceptable that walking and cycling are promoted as an alternative to car use for short distance trips.	○	●	○	●
	22	It is acceptable that an employer pays bicycle subsidies.	●	○	○	●
Multi-modal navigation tool	20	It is acceptable that you can plan your own (multimodal) route by means of route planning software made available by public transport companies.	○	●	○	●
Parking and land-use management						
Commercial centers	3	It is unacceptable that many local shops are replaced by huge commercial centres.	●	○	○	●
New urbanism	7	It is acceptable that shops are within a 10 minute walking distance from home.	●	○	○	●
Location efficient development	11	It is acceptable that shopping malls are constructed at highly accessible locations.	●	○	○	●
Parking management	23	It is acceptable that parking is prohibited at certain locations.	●	○	●	○
	16	It is unacceptable that underground parking in cities is promoted.	○	●	●	○
Parking pricing	27	It is acceptable that fringe parking is free-of-charge.	●	○	○	●
	32	It is acceptable that parking in the city center is expensive.	●	○	●	○
Transit oriented development	17	It is acceptable that the use of public transport is stimulated by building offices nearby train stations.	●	○	○	●
	42	It is acceptable that commercial areas in the proximity of train stations are not accessible by car.	●	○	●	○
Smart growth	24	It is acceptable that higher density development is encouraged.	●	○	○	●
	36	It is unacceptable that areas are developed explicitly oriented at public transport.	●	○	○	●

Policy measure	n°	Statement	Hard	Soft	Push	Pull
Connectivity	28	It is acceptable that small alleys are provided such that people using slow modes do not have to make detours.	●	○	○	●
Institutional policy revision						
Car-free planning	4	It is acceptable that city centers are highly accessible by alternative transport modes.	●	○	○	●
	33	It is acceptable that car use is prohibited in certain parts of the city center.	●	○	●	○
Operations and Management Programs	37	It is acceptable that public transport is put into service for special events.	●	○	○	●
	8	It is unacceptable that a scheduled service bus can make use of the hard shoulders on highways.	●	○	○	●
Least-cost Transportation Planning	12	It is acceptable that no investments are made in new road infrastructure.	●	○	●	○

2.3 P-Set

A Q-methodological study does not require a large number of participants (P-set) in order to find meaningful, discernable groups. Barry and Proops (*18*) illustrated that a larger P-set would not be beneficial in a Q-study. The reliability of the methodology in terms of replication of schematically reliable discourses across different respondents, is assured by the fact that the Q-sample is well-structured and by the finding that only a limited number of distinct viewpoints exist on any topic (*21*). Reliability, in terms of the ability to generalize sample results to the general population is of less concern here, as the main focus of the methodology is to identify a topology, not to test the typology's proportion distribution within the larger population (*15*).

Since the focus of this research lies on the acceptability of demand-restricting policy measures that often involve car-use, participants had to be at least 18 years old, the age-level for legally obtaining a driving license in Belgium. Besides age, car possession and gender were also used to balance the P-set. Correspondingly, a three-dimensional structure of the P-set was obtained, consisting of 12 ($3 \times 2 \times 2$) logical combinations: three age categories (18-25, 26-64, ≥65), gender, and car ownership (yes/no). For each of the 12 combinations, three persons were searched. For the category older males without a car, no participants were recruited, resulting in a study population of 33 persons.

2.4 Q-sorting

After the formulation of the statements (Q-sample) and selection of the respondents (P-set), the respondents need to rank-order the different statements according to their points of view, a process that is referred to as 'Q-sorting' (*21*). To lower complexity, participants are not required to carry out a complete rank ordering of the different statements. Instead, they have to assign each statement to a ranking position in a fixed quasi-normal distribution. An important element in this rank-ordering process is that each respondent can use his or her own subjective criteria to evaluate the different statements (*19*).

The 42 statements in this study were all printed on randomly numbered cards. Respondents were instructed to attentively read through all of the statements and asked to what extent they agreed with the statements. First, they had to order them into three piles: general

agree, general disagree, and neutral/undecided. Next, the respondents had to rank-order the statements further according to the quasi-normal distribution illustrated by Table 3. A value of +4 indicates the largest agreement with the statement, a value of -4 the largest disagreement. This distribution restriction may alarm some researchers, yet such concerns are largely misplaced, as an array of statistical comparisons demonstrate that distribution effects are virtually non-existent and thus, the chosen distribution does not significantly affect the discourses (segments) that emerge from the analysis (*19*).

TABLE 3 Quasi-Normal Distribution

Values	-4	-3	-2	-1	0	+1	+2	+3	+4
Number of statements	2	3	5	7	8	7	5	3	2

2.5 Analysis

To analyze the Q-sorts and extract the underlying segments, the software package PQMethod (*24*) was used. After entering all 33 Q-sorts in the program, the intercorrelation matrix of the Q-sorts is factor-analyzed by the centroid procedure. In contrast to traditional factor analysis, the psychometrics of Q-methodology call for the correlation and factoring of persons, as opposed to tests, traits, etc (*21*). A selection of the resultant factors is then rotated using varimax rotation. Varimax rotation fits perfectly with the primary objective of Q-methodology, namely the disclosure of the range of segments in the participant group. Given this objective, it makes theoretical sense to pursue a rotated solution which maximizes the amount of variance explained by the extracted factors (*19*).

Different criteria are used to determine the number of factors that have to be rotated. A first criterion is that only factors with eigenvalues exceeding one should be considered for extraction (*15*). Eigenvalues are a measure of the relative contribution of a factor to the explanation of the total variance in the correlation matrix. Factors with an eigenvalue greater than one explain more variance than a single Q-sort would (*21*). Nine factors met this first criterion. A second criterion is that an interpretable Q-methodological factor must have at least two Q-sorts (the ranked statements of two respondents) that load significantly upon it alone (*19*). A Q-sort was considered to significantly load upon a single factor when the correlation between the factor and the Q-sort exceeded 0.50 and cross-loadings of the Q-sort with other factors were smaller than 0.40. This second criterion was met with a four factor solution. Note that a four-factor solution appears to be common in the paradigm of sustainable transport planning as Barry and Proops (*18*), Kaufmann (*13*), van Exel et al. (*25*), Rajé (*15*) and Cools et al. (*16*) all suggested that four segments preponderate the paradigm.

3 RESULTS

Four different segments to acceptance of demand-restricting policy measures were found: (*i*) travelers who are in favor of traffic calming policy measures (segment A), (*ii*) travelers who are against hard push measures (segment B), (*iii*) travelers who are in favor of demand-restricting policy measures (segment C), and (*iv*) travelers who are against innovative policy measures (segment D). These four subgroups account for 56% of the variation in the Q-sorts.

Recall that both similarities and differences between the different subgroups provide essential information for policy makers. These similarities and differences can be derived from the factor Q-values and normalized factor scores (Z-scores) displayed in Table 4. The factor Q-values for each statement indicate how each group ranked the items (*26*). The Z-scores denote how far each item is from the overall group mean. A summary profile for each of the segments is obtained by combining the information from the Q-sort values and the distinguishing characteristics derived from the Z-scores (*26*).

TABLE 4 Factor Q-Sort Values and Normalized Factor Scores

	Factor Q-sort values				Normalized factor scores			
No.	**Segment A**	**Segment B**	**Segment C**	**Segment D**	**Segment A**	**Segment B**	**Segment C**	**Segment D**
1	2	1	2	1	0,809	0,714	0,995	0,347
2	0	0	0	0	-0,111	-0,074	0,259	0,166
3	0	-1	-1	-1	0,326	-0,565	-0,461	-0,115
4	0	2	2	2	0,285	1,045	0,998	0,812
5	-1	0	0	-2	-0,394	0,100	0,071	-0,831
6	-2	3	-3	-2	-0,751	1,740	-1,610	-0,867
7	-1	1	-2	1	-0,622	0,317	-0,754	0,402
8	-2	-3	-4	-3	-1,223	-1,188	-1,838	-1,294
9	-3	0	-4	-2	-1,411	0,041	-1,872	-1,061
10	-1	4	-1	1	-0,464	1,882	-0,562	0,226
11	0	2	0	-1	0,156	0,734	0,143	-0,120
12	-3	-3	-1	0	-1,474	-1,404	-0,587	0,189
13	1	-2	1	1	0,368	-0,845	0,844	0,346
14	4	4	2	4	1,962	1,991	1,028	2,051
15	3	2	0	3	1,073	1,067	0,210	1,103
16	-2	-4	-3	-1	-1,175	-1,660	-1,378	-0,577
17	2	3	1	0	0,781	1,093	0,781	-0,046
18	2	1	3	0	0,997	0,426	1,088	0,072
19	-2	-2	4	-4	-1,213	-1,137	1,493	-1,689
20	1	1	0	-2	0,500	0,506	0,000	-1,110
21	0	-1	-1	-1	0,212	-0,406	-0,501	-0,526
22	3	3	2	0	1,456	1,579	0,859	0,060
23	2	-1	1	2	0,631	-0,539	0,442	0,997
24	-1	0	0	-1	-0,504	-0,075	0,018	-0,648
25	1	1	1	0	0,401	0,628	0,664	0,065
26	2	-2	0	1	1,047	-1,062	-0,322	0,193
27	0	3	4	2	0,070	1,209	1,925	0,817
28	-1	0	2	3	-0,605	0,141	0,871	1,283
29	-3	-2	-3	1	-1,360	-0,838	-1,468	0,346
30	0	1	3	3	-0,057	0,194	1,298	1,391
31	4	-3	-3	-4	2,032	-1,257	-1,227	-1,580
32	-2	-4	1	-2	-0,911	-1,841	0,507	-1,114
33	3	-1	3	-1	1,084	-0,411	1,493	-0,697
34	1	0	1	4	0,562	0,006	0,735	2,100
35	1	2	-1	0	0,430	0,762	-0,559	0,002
36	-4	-2	-2	-3	-1,666	-0,838	-0,874	-1,281
37	0	2	3	2	0,284	0,815	1,103	0,828
38	3	-1	-2	3	1,581	-0,191	-0,859	2,045
39	1	0	0	0	0,328	-0,136	-0,225	-0,007
40	-1	0	-1	2	-0,339	-0,061	-0,630	0,577
41	-3	-2	-2	-3	-1,499	-1,035	-1,168	-1,279
42	-4	-3	-2	-3	-1,594	-1,432	-0,930	-1,578

3.1 Similarities Between the Different Subgroups

Similarities between the different subgroups indicate general agreement and pin-point for which policy measures an overall solid social basis exists, or in contrast, for which policy measures such social basis is completely lacking. Table 5 shows the consensus statements for which a clear agreement or disagreement (average Q-sort values (aqv.) strictly smaller than -1 or strictly greater than +1) exists. In the remainder of the text square brackets refer to the Q-sort values; the first number between the square brackets corresponds to the statement number, the second number corresponds to the (average) Q-sort value.

TABLE 5 Consensus Statements

Policy measure	No.	Aqv.	Hard	Soft	Push	Pull
Improved transport options						
Ridesharing	1	1.50	○	●	○	●
Cycling improvements	41	-2.50	●	○	○	●
Parking and land-use management						
Transit Oriented Development	42	-3.00	●	○	●	○
Smart Growth	36	-2.75	●	○	○	●
Institutional policy revision						
Car-free Planning	4	1.50	●	○	○	●
Operations and Management Programs	37	1.75	●	○	○	●
Operations and Management Programs	8	-3.00	●	○	○	●

There is a general agreement that public transport has to play an important role in a demand-restricting policy. Important destinations such as city centers [4,+1.50] or locations where huge events are organized [37,+1.75] should be easily accessible by public transport. Moreover, accessibility by public transport should be a key issue in future urban development [36,-2.75]: "*King car should not always have the final word, various public transport modes should be preferred*". The key role that everyone attributes to public transport can be accounted for by the fact that all travelers, including the ones that have fewer transport options, should be able to reach important city locations [42,-3.00]. The attractiveness of public transport should be stimulated by prioritizing public transport by allowing a scheduled service bus to make use of the hard shoulders on highways [8,-3.00].

Next to the clear preference for a more dominant role for public transport, there is a general consensus for improved transport options of alternative transport modes. It is generally accepted that by carpooling, travel costs are spread [1,+1.50] and that sufficient bicycle shelter should bee provided nearby train stations [41,-2.50].

3.2 Differences Between the Different Subgroups

Differences between segments also provide essential information for policy makers, as they allow the tailoring of policy actions to specific subgroups in order to create the required public support. The contention statements that subgroup (concourse) members have ranked significantly differently from other subgroups are displayed in Table 6. From this Table it is clear that the different policy strategies matter in explaining differences in acceptance of policy measures.

TABLE 6 Distinguishing Statements (P-Value < 0.05)

Policy strategy	Distinguishing statements (statement numbers)			
	Segment A	Segment B	Segment C	Segment D
Improved transport options	31	9,13	14	29,34
Incentives to use alternative modes	26	6,10,26	6,15,19	10,20,22
Parking and land-use management	27,28	23,28,32	27,32	17
Institutional policy revision	-	-	12	12

Next to indicating those elements that differentiate segments, it is important to get deeper insight into the rationale of each of the identified subgroups. By combining the information from the Q-sort values (Table 4) and the distinguishing characteristics (Table 6) a summary profile for each of the segments is obtained.

3.2.1 Segment A: travelers in favor of traffic calming policy measures

The first segment is characterized by a noticeably higher acceptance of traffic calming and speed reducing policies. Members of this group favor installation of physical speed reduction measures such as speed humps [31,+4.00], support the introduction of a speed limit of 30km/h in school zones [38,+3.00], and encourage the installation of more speed cameras [26,+2.00].

In addition, this subgroup is typified by a general acceptance of hard policy measures to stimulate bicycle use. Members of this subgroup favor the construction of improved bicycle tracks [14,+4.00] and support the fact that employers pay bicycle subsidies to their employees [22,+3.00]. Poor conditions of the bicycle tracks in Flanders (Dutch speaking part of Belgium) are indicated as a barrier to shift to this mode.

This subgroup also encourage that car use is prohibited in city centers [33,+3.00] and that certain roads are closed to avoid through traffic [9,-3.00]. Members of this subgroup indicate that these policy measures are the only solution to ensure the livability of the city centers. When cars are prohibited, children can play outside and social contacts within the neighborhood are enhanced.

Finally, this subgroup has a clear objection to least-cost transport planning [12,-3.00]. The members belonging to this segment stress the importance of investment in new road infrastructure to support economic development.

3.2.2 Segment B: travelers against hard push measures

The second subgroup is marked by an extremely low acceptance of hard push measures. Soft and pull measures on the other hand are more favored by this subgroup. Increases in fuel prices [10,+4.00], variable pricing for car use [6,+3.00] and higher parking prices nearby city centers [32,-4.00] are unacceptable for members of this subgroup. Nonetheless, the stimulation of car use, by investing in improved bicycle tracks [14,+4.00] and by providing financial benefits for cycling [22,+3.00], is perceived as acceptable.

Although this subgroup opposes to push measures concerning parking management, the subgroup is in favor of parking-related pull measures such as the promotion of underground parking [16,-4.00] and free fringe parking [27,+3.00]. The creation of a more beautiful cityscape by letting historical places stand out well is quoted as the underlying motivation for the acceptance of these measures.

In comparison to the other subgroups, this segment perceives prioritizing trams [13,-2.00], introducing parking restrictions [23,-1.00] and closing particular roads to avoid through traffic, to be less acceptable.

3.2.3 Segment C: travelers in favor of demand-restricting policy measures

The third segment is typified by a clearly higher acceptance of demand-restricting policy measures as the other segments. Broader public support for parking pricing and distance-based taxes characterizes this segment. This segment favors the parking pricing principle that fringe parking is free-of-charge [27,+4.00], whereas parking in the inner-city is financially penalized [32,+1.00]. In addition, kilometer charging, which encourages car use reductions, is perceived acceptable [19,+4.00; 6,+3.00].

Besides, members of this subgroup agree with different policy measures that enhance the livability of the city. Making parts of the city center car-free [33,+3.00], stimulating underground parking [16,-3.00] and closing roads to tackle through traffic are perceived as acceptable policy measures pursuing this goal.

3.2.4 Segment D: travelers against innovative policy measures

The final subgroup can be distinguished by their opposition to innovative policy measures. The necessity of multi-modal navigation tools [20,-2.00] and promotion of ridesharing [29,+1.00] is seriously questioned by this subgroup, indicating the dislike for innovative policy measures. Notwithstanding, telework is perceived as highly acceptable [34,+4.00].

4 DISCUSSION AND POLICY ADVICE

Investigation of the social acceptance of policy measures underlined that especially pull measures are perceived acceptable. This implies that policy makers should primarily focus on this type of policy measures when planning and implementing an integrated transport policy for which a large social acceptance exists. The similarities between the different subgroups highlighted three important issues that policy makers should take into account when formulating their transport policy: (*i*) the important role everyone attributes to public transport, (*ii*) the need to improve bicycle infrastructure, and (*iii*) the acknowledgement of the potential of ridesharing.

Concerning public transport, policy makers might gain from explicitly tailoring future urban developments on public transport systems. On a local level, it is important that these systems are reliable, fast and comfortable. Thus, the influence of congestion on public transport systems should be minimized. A possible way forward is the introduction of separate bus lanes. On a more regional level, a high inter-exchangeability between different public transport systems should be guaranteed. The location of multi-modal transport nodes should optimize transfer times and accessibility of different types of travelers. An essential element is that the timetables of the different services are matched. In addition to maximizing the accessibility of destination zones by public transport, the accessibility of the origin zones by public transport should also be enhanced. Herein lies the rub for Flemish policy makers as the urban environment is shattered by ribbon development (*27*). Consequently, a close collaboration between transport and urban planners is essential to focus future urban development on accessibility by public transport systems.

Secondly, improving current bicycle infrastructure should be a key priority for policy makers. The current network of bicycle tracks needs to be upgraded and extended, taking into account a multitude of aspects including safety, comfort, attractiveness, directness and coherence. Moreover, bicycles are often used as a secondary transport mode before and after the leading transport mode. Therefore, improved and additional bicycle shelter could further enhance bicycle use. Besides, a close cooperation with specific target groups (e.g. schools and companies) could be beneficial.

The third important issue is the potential of rideharing. Policy makers should facilitate carpooling. On the one hand, investments concerning the infrastructure should be made. On the other, travelers need to be informed about the advantages of ridesharing, in particular cost savings, and about the various possibilities to find carpooling partners.

Concerning other policy measures there is no overall consensus. Nonetheless, the differences between the various subgroups are very useful, since they serve as tailoring cues for future policy actions. Table 7 provides an overview of alternative approaches to implement certain policy measures. For each policy measure, it is indicated whether social acceptance is present in the different subgroups: ✓ indicates the presence of public support for the policy measure, × refers to the absence of a social basis, and o indicates that the segment is neutral concerning the acceptability of the policy measure.

TABLE 6 Policy Measures to Conduct a Differentiated Policy

Policy measure	Segment				Possible alternative approach
	A	B	C	D	
Traffic calming [31]	✓	×	×	×	Only install speed humps where absolutely necessary, as there are more subtle ways to achieve a traffic calming effect including a smaller camber, and the implantation of trees to create a sense of enclosure.
Fuel taxes [10]	✓	×	✓	×	(*i*) Compensate increased fuel prices by lowering fixed costs (purchase price, insurance, etc) and inform people of this compensation. (*ii*) Promotion campaigns to stimulate people to reduce their car use.
Distance-based taxes [6,19]	o	×	✓	×	Some target groups, for instance people working in the home health care sector, do not have fully fledged alternatives to their car. For these target groups special arrangements can be made, increasing the social basis for the policy measure.
Parking pricing [32]	×	×	✓	×	Policy makers should try to optimize parking behavior by (*i*) providing free fringe parking, (*ii*) introducing maximum parking times next to higher parking prices in the city centers, and (*iii*) providing parking permits for local residents and disabled people.

5 CONCLUSION

This research explored how people evaluate the acceptability of different demand-restricting transportation measures and identified four distinct sets of attitudes toward various policy measures. Similarities between the different subgroups underlined that public transport has to play an important role in a demand-restricting policy. Next to improving public transportation, the resemblances also illustrated that there exists a solid social acceptance concerning policy measures that stimulate ridesharing and bicycle use.

The policy measures for which no overall acceptance existed, did provide essential information for policy makers to tailor policy actions to specific subgroups. An overview of alternative approaches to implement contested policy measures was provided.

The distinguishing statements in this research can be adopted by future research attempts to analytically investigate the identified segments. Using the distinguishing statements in a large-scale survey enables the formal testing of hypotheses about the relationships between the segments and different socio-economic and other relevant variables. In addition, future research could focus on the underlying indicators (fairness, effectiveness, infringement of freedom) of the acceptability of policy measures.

6 REFERENCES

(1) Haustein, S., and M. Hunecke. Reduced Use of Environmentally Friendly Modes of Transportation Caused by Perceived Mobility Necessities: An Extension of the Theory of Planned Behavior. *Journal of Applied Social Psychology*, Vol. 37, No. 8, 2007, pp. 1856-1883.

(2) Schuitema, G., L. Steg, and S. Forward. Explaining differences in acceptability before and acceptance after the implementation of a congestion charge in Stockholm. *Transportation Research Part A: Policy and Practic*e, Vol. 44, No. 2, 2010, pp. 99-109.

(3) Stringham, S. H. Does Quality Management Work in the Public Sector? *Public Administration and Management*, Vol. 9, No. 3, 2004, pp. 182-211.

(4) Anable, J. 'Complacent Car Addicts' or 'Aspiring Environmentalists'? Identifying travel behaviour segments using attitude theory. *Transport Policy*, Vol. 12, No. 1, 2005, pp. 65-78.

(5) Eriksson, L., J. Garvill, and A. M. Nordlund. Acceptability of travel demand management measures: The importance of problem awareness, personal norm, freedom, and fairness. *Journal of Environmental Psychology*, Vol. 26, No. 1, 2006, pp. 15-26.

(6) Janssens, D., M. Cools, E. Moons, G. Wets, T. A. Arentze, and H. J. P. Timmermans. Road Pricing as an Impetus for Environment-Friendly Travel Behavior: Results from a Stated Adaptation Experiment. In *Transportation Research Record: Journal of the Transportation Research Board*, No. 2115, Transportation Research Board of the National Academies, Washington, D.C., 2009, pp. 50-59.

(7) Stradling, S. G., M. L. Meadows, and S. Beatty. Helping drivers out of their cars: Integrating transport policy and social psychology for sustainable change. *Transport Policy*, Vol. 7, No. 3, 2000, pp. 207-215.

(8) Thorpe, N., P. Hills, and S. Jaensirisak. Public attitudes to TDM measures: a comparative study. *Transport Policy*, Vol. 7, No. 4, 2000, pp. 243-257.

(9) Marshall, S., and D. Banister. Travel reduction strategies: intentions and outcomes. *Transportation Research Part A: Policy and Practice*, Vol. 34, No. 5, 2000, pp. 321-338.

(10) May, A. D., A. F. Jopson, and B. Matthews. Research challenges in urban transport policy. *Transport Policy*, Vol. 10, No. 3, 2003, pp. 157-164.

(11) Gärling, T., and G. Schuitema. Travel Demand Management Targeting Reduced Private Car Use: Effectiveness, Public Acceptability and Political Feasibility. *Journal of Social Issues*, Vol. 63, No. 1, 2007, pp. 139-153.

(12) Victoria Transport Policy Institute. *Online TDM Encyclopedia*. Victoria Transport Policy Institute, Victoria, BC. http://www.vtpi.org/tdm/tdm12.htm. Accessed Apr. 5, 2010.

(13) Kaufmann, V. Modal Practices: From the rationales behind car & public transport use to coherent transport policies. Case studies in France & Switzerland. *World Transport Policy & Practice*, Vol. 6, No. 4, 2000, pp. 8-15.

(14) Guiver, J. W. Modal talk: Discourse analysis of how people talk about bus and car travel. *Transportation Research Part A: Policy and Practice*, Vol. 41, No. 3, 2007, pp. 233-248.

(15) Rajé, F. Using Q methodology to develop more perceptive insights on transport and social inclusion. *Transport Policy*, Vol. 14, No. 6, 2007, pp. 467-477.

(16) Cools, M., E. Moons, B. Janssens, and G. Wets. Shifting towards environment-friendly modes: profiling travelers using Q-methodology. *Transportation*, Vol. 36, No. 4, 2009, pp. 437-453.

(17) Diana, M., and C. Pronello. Traveler segmentation strategy with nominal variables through correspondence analysis. *Transport Policy*, Vol. 17, No. 3, 2010, pp. 183-190.

(18) Barry, J., and J. Proops. Seeking sustainability discourses with Q methodology. *Ecological Economics*, Vol. 28, No. 3, 1999, pp. 337-345.

(19) Watts, S., and P. Stenner. Doing Q methodology: theory, method and interpretation. *Qualitative Research in Psychology*, Vol. 2, No. 1, 2005, pp. 67-91.

(20) Brown, S. R. A Primer on Q Methodology. *Operant Subjectivity*, Vol. 16, No. 3-4, 1993, pp. 91-138.

(21) McKeown, B., and D. Thomas. *Q Methodology*. Sage, Newbury Park, CA, 1988.

(22) Stephenson, W. *The Study of Behavior: Q-Technique and Its Methodology*. University of Chicago Press, Chicago, 1953.

(23) Litman, T. The Online TDM Encyclopedia: mobility management information gateway. *Transport Policy*, Vol. 10, No. 3, 2003, pp. 245-249.

(24) Schmolck, P. *PQMethod 2.11*, November 2002. www.lrz-muenchen.de/~schmolck/qmethod/downpqx.htm. Assessed July 26, 2010.

(25) van Exel, N. J. A., G. de Graaf, and P. Rietveld. Getting from A to B: Operant Approaches to Travel Decision Making. *Operant Subjectivity*, Vol. 27, No. 4, 2004, pp. 194-216.

(26) Donner, J. C. Using Q-Sorts in Participatory Processes: An Introduction to the Methodology. In Krueger, R. A., M. A. Casey, J. C. Donner, S. Kirsch, and J. N. Maack (eds.) *Social Analysis: Selected Tools and Techniques,* Social Development Department, The World Bank, Washington, DC, 2001, pp. 24-49.

(27) Boussauw, K., and F. Witlox. Introducing a commute-energy performance index for Flanders. *Transportation Research Part A: Policy and Practice*, Vol. 43, No. 5, 2009, pp. 580-591.