

# Segmentation research for sustainable transport: do's and don'ts

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## ABSTRACT

Segmentation research projects are often relatively large and complex, putting them at risk of wasting time and money. This paper suggests some do's and don'ts to help guide sound planning and to minimise such risks for segmentation research about sustainable transport. It is based on recent work reviewing local and international literature, and also the practical experience of doing segmentation research (both quantitative and qualitative).

Don'ts:

- Don't lose sight of the practical goals
- Don't think there is only one way to do segmentation research
- Don't let wishful thinking drive your segments
- Don't leave major scoping/planning issues to the vagaries of a competitive tender focused on data collection.

Do's:

- Do segment, even if you can't afford segmentation research
- Do consider carefully whether you really need segmentation research
- Do consider the size of your market
- Do aim to include factors known to be important from non-segmentation research
- Do be wary when identifying people most likely to change, the 'low-hanging fruit'
- Do consider carefully how sustainable transport behaviour differs from other behaviour where segmentation is used.

## 1 INTRODUCTION

Segmentation is the process of dividing a market into different groups of customers with the purpose of creating different products, services, and/or communications to meet their specific needs. It is one of the fundamental practices of commercial and social marketing, arising naturally from marketing's focus on the customer. It is clearly relevant to travel behaviour change:

There is a general consensus in the literature that a staged and targeted strategy of travel behaviour change is likely to be more effective than a 'one size fits all' approach. (Anable, Lane, & Kelay, 2006a, p. 12)

In terms of specific marketing activities, most of the respondents [186 members of the American Public Transit Association and the Association for Commuter Transportation] report using segmentation strategies (89%). (Cronin & Hightower, 2004, p. 33)

However, exactly how to do such segmentation for sustainable transport is far from an established process internationally.

Research on how best to define target groups of travellers is in its infancy. In the transport sector there have been very few attempts to define distinct mobility segments in a systematic and psychologically meaningful sense. (Anable, Lane, & Kelay, 2006a, p. 12)

## **2 DO'S AND DON'TS**

### **2.1 Don't lose sight of the practical goals**

Segmentation is a means to an end. So the precise objectives for segmenting are important in choosing how to segment (e.g. increasing use of public transport only, or active modes too; mainly peak time, or off-peak too?). General reasons to segment are quite practical: it is a way to get more value by tailoring interventions or communications to fit target audiences better.

In short, many find segmenting useful to get 'more bang for the buck'. However, it is easy to lose sight of the practical goals in the midst of complexities (e.g. multivariate statistics) that are often part of segmentation research.

### **2.2 Do segment, even if you can't afford segmentation research**

Simple segmentation is so common in business and analysis of service provision that it is often not formally labelled as segmentation, let alone 'segmentation research'. For example, the well-known '80–20 rule' often results in different treatment of clients based on usage (e.g. special treatment for the 20% of clients providing 80% of sales).

Where substantial research is not involved or segmentation is peripheral to the overall research, we label it a 'segmentation exercise' rather than 'segmentation research'. This will often be true where simple sales or usage data can be used to follow a simple rule like the 80–20 rule.

Although this paper focuses more on segmentation research, this should not be taken as discouraging the simpler 'segmentation exercises'. On the contrary, if you can see some useful way of splitting up target markets that might be done quickly and cheaply by use of existing data (e.g. existing regular users, occasional users, non-users) and/or some thinking, then we encourage you strongly to do so. Our focus on delivering warnings and hints here about segmentation research is because it tends to cost much more and to take much longer than segmentation exercises.

### **2.3 Don't think there is only one way to do segmentation research**

Deciding how best to do segmentation is often difficult because of the many ways of segmenting, and the diversity of these ways.

### 2.3.1 Different methods of segmentation

The methods for doing segmentation vary in terms of the segmentation **process**, the **bases**, and the **data type** (see Table 1). The different methods are best clarified by examples (which follow the table).

**Table 1: Different ways of doing segmentation**

Segmentation process	<b>Pre-determined</b> ('a priori') vs <b>market-defined</b> ('post hoc') i.e. whether the number of segments and how people are to be split between them is known in advance of data collection (pre-determined) or only after collection of market data (market-defined).
Bases of segmentation	<p><b>Geographic</b> such as by region, size of city, or density of population</p> <p><b>Demographic</b> such as age, gender (including social class/sociodemographic)</p> <p><b>Behavioural</b>, especially usage (e.g. regular cyclists vs occasional cyclists vs non-cyclists)</p> <p><b>Psychographic</b> such as attitudes, values, lifestyles (activities, interests, opinions), personality</p> <p><b>Benefits</b> such as perceived costs and benefits (e.g. of changing to a different mode of transport)</p>
Data type	<b>Quantitative</b> (e.g. from surveys or patronage data) vs <b>qualitative</b> (e.g. from focus groups).

An example of pre-determined segmentation for public transport (PT) planning from the US would be using the guidelines in Table 2. Another example would be using the five 'stages of change' (i.e. pre-contemplation, contemplation, preparation, action, maintenance) as segments (e.g. TravelSmart Victoria, 2003; Sullivan & O'Fallon, 2006).

**Table 2: Recommendations for bus service levels based on housing density (Celsor & Millard-Ball, 2007)**

Dwelling units per acre	Frequency
15	120 buses/day
7	40 buses/day
4	20 buses/day

In contrast, market-defined segmentation does not start with a firm judgment that a factor like housing density will determine the segments. Instead, data is collected on a number of variables and then statistical techniques are used to explore groupings. Market-defined segmentation **always** requires some primary research (typically data collection by surveys).

Anable (2005) illustrates how very different market-defined segmentation can be. Rather than a single variable like density as above, her starting base for segmentation was 105 attitude statements rated in a survey. Figure 1 shows segments<sup>1</sup> that have attracted

<sup>1</sup> The diagram is from closely-related later work resulting in slightly different segment labels.

considerable interest in New Zealand. The segments were created by multivariate statistical analysis (factor analysis of the attitude ratings followed by cluster analysis).

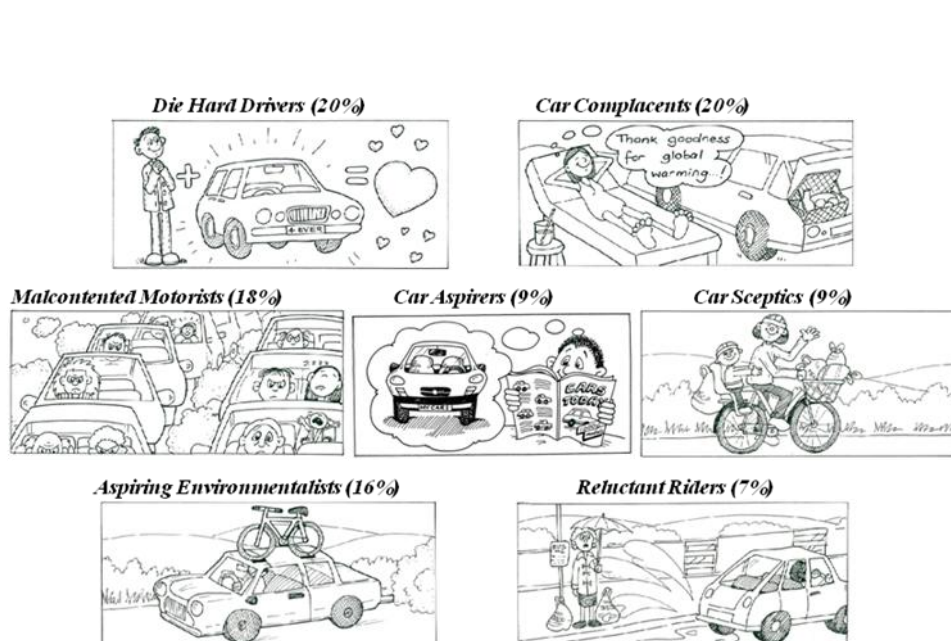


Figure 1: Some market-defined (psychographic) segments (Anable, Lane, & Kelay, 2006a)

The two examples above illustrate use of a single 'base' for segmentation: a geographic base for the recommendations for bus service levels based on housing density; a psychographic/attitudinal base for Anable's segments.

In practice, two or more of the bases above are often used, that is, a **hybrid** method. A hybrid approach is illustrated by Metlink's classification (Figure 2) based on at least two bases: usage, purpose, and perhaps demographics or attitudes. Usage is reflected in the change from left to right of the diagram shown by the top three levels of labels (e.g. *Rare* versus *Regular*) and the scale at the bottom (from *Low* to *Very High*). Purpose is reflected in the fourth level of labels (e.g. *Tourism* versus *Commuter*). Demographics and/or attitudes may be reflected in the fifth level of labels (e.g. *Dependent Frequenters* versus *Confident Regulars*).

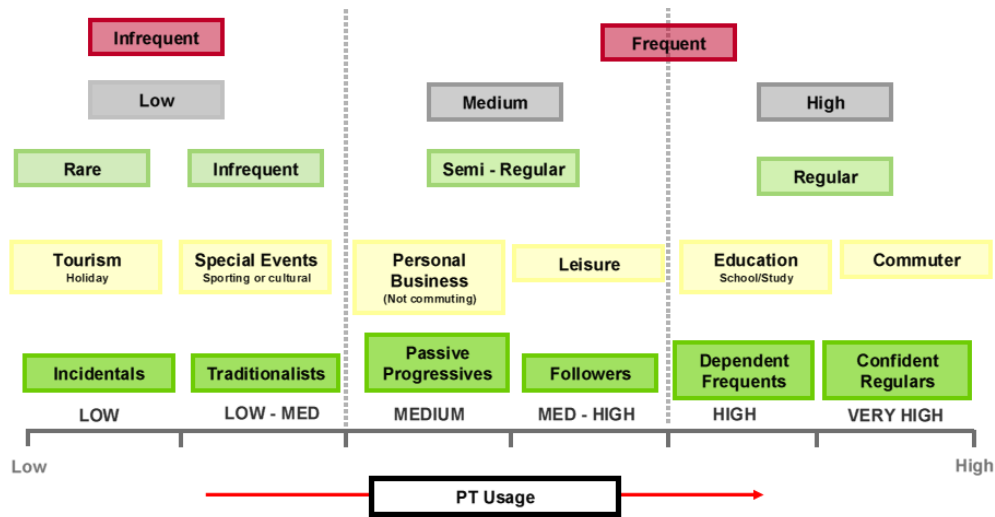
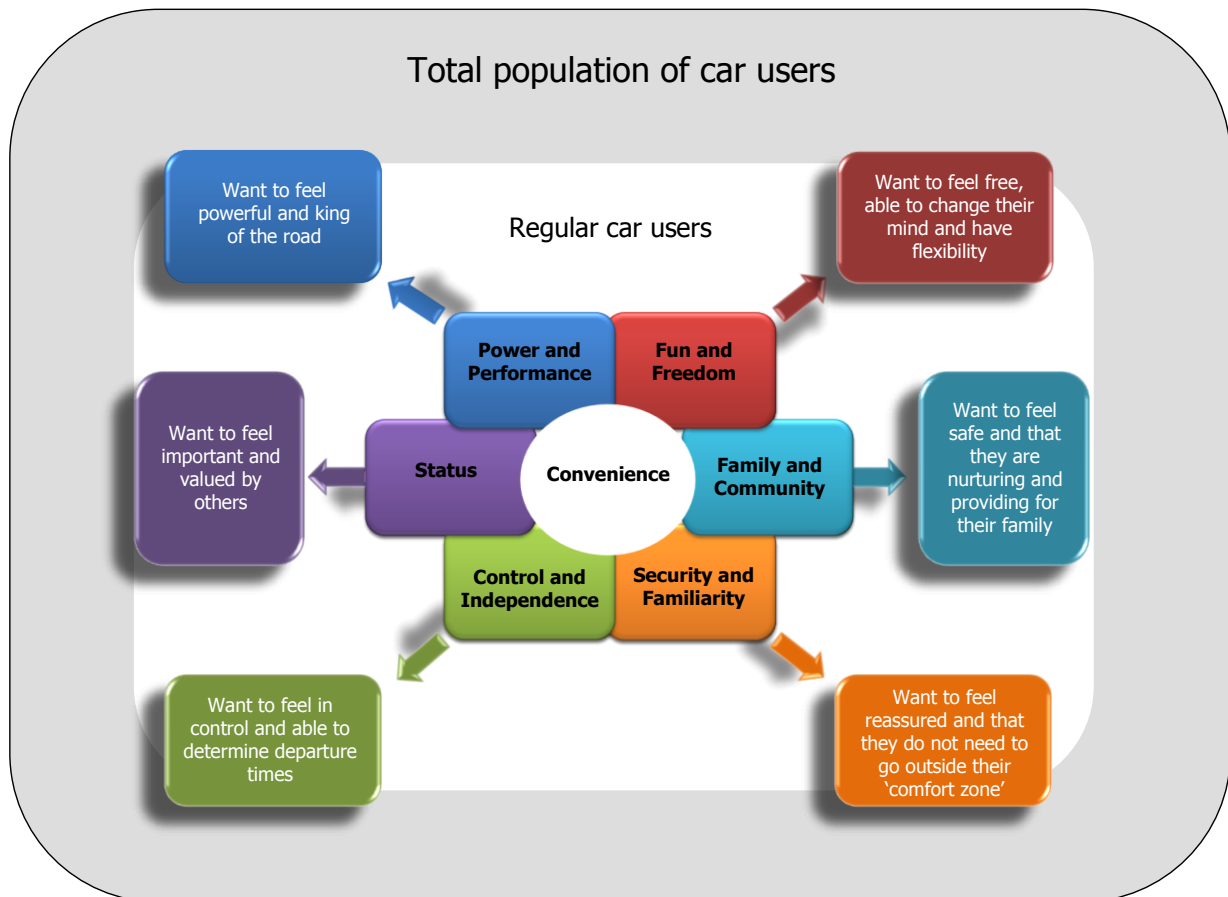


Figure 2: Hybrid PT segmentation from Metlink Melbourne (Rigioni, 2007)

Most segmentations about sustainable transport use quantitative data. Indeed, it is difficult to find qualitative segmentations (an interesting exception being five cyclist segments determined using qualitative methods in UK cities; Davies, Halliday, Mayes, & Pocock, 1997).

We recently helped with an extensive qualitative project (99 interviews with regular car users in 10 cities) investigating emotive factors underlying transport mode choice for urban travel in New Zealand (Yockney, Comfort, Sullivan, & Wallis, 2009). Data collection was much more in-depth (in-home interviews lasting 1 ½ to 2 hours) than for quantitative surveys. As one component of the reporting, segmentation was useful to summarise six common themes and underlying needs relating to motivation of regular car users (see Figure 3 for a summary diagram).



**Figure 3: Car-user segments and emotive needs met by car use**

To show how the underlying data type is quite different to quantitative counts or ratings, below is one of the 'pen portraits' used to illustrate one segment (Fun & Freedom):

**Pen portrait:** Marcus lives in Hamilton with his fiancée Natalie. Since he was a school boy, Marcus has always dreamed of owning a classic HQ Holden. So with the money he saved from his job at the local panel beaters he bought an old Holden HQ in rough condition and has occupied much of his spare time for the last two years painstakingly restoring it. It is now his pride and joy, and he loves nothing more than meeting up with a few of his mates, who also own classic Holdens, and going for a cruise. It's not all about speed and performance for Marcus, it is about the pride he gets from showing off his car to people and the camaraderie of other enthusiasts. He and his mates were all really excited about the Hamilton 400 V8 race coming to town and were there to watch and talk cars for the whole weekend. For Marcus, his car is not only a means of transport, it represents who he is and what he is good at.

### 2.3.2 Conclusions about diverse segmentation methods and implications

Our first conclusion about the diverse segmentation methods: No one segmentation method is generally the best.

- Good information about common strengths and weaknesses is available in Elmore-Yalch (1998). This US Transportation Research Board handbook remains extremely useful despite its age and restriction to public transport.

Our second conclusion about the diverse methods (which flows from the first): 'Horses for courses' planning is vital to tailor segmentation methods to objectives and context (size, resources, geography, existing programmes, organisational strengths or weaknesses).

The remaining do's and don'ts in this paper aim to help such planning.

## **2.4 Do consider carefully whether you really need segmentation research**

### **2.4.1 Do your likely interventions need segmentation research beforehand?**

Several major travel behaviour change interventions (e.g. workplace travel plans, school travel plans, individualised marketing) do not need prior segmentation research. So if most of your likely interventions are like these ones, it is difficult to see segmentation research as useful. Furthermore, it suggests that segmentation research might not play the same role in marketing strategy with travel behaviour change that it does in other areas of social marketing or commercial marketing (this point can be important for those who feel a need for segmentation research because of their experience in other areas of marketing).

For example, consider individualised marketing (also known as personalised marketing or personalised travel planning), an approach to delivering targeted information directly to travellers, to help them make sustainable travel choices (for an excellent overview published by the UK Department for Transport, see Integrated Travel Planning, 2007).

Several applications in Australia are large-scale; for example, the North Brisbane project covered 70,000 households (Socialdata Australia, 2007). In Brisbane (very much as in other IndiMark® studies) people were segmented into the three main groups of IndiMark® defined with respect to use of environmentally friendly modes as:

- **I**—Interested (i.e. not currently using sustainable modes on a regular basis but expressed an interest in receiving information about them)
- **R**—Regular (i.e. already regular users of sustainable modes), some of whom still might want extra information
- **N**—Not Interested (i.e. did not require any information about sustainable modes).

That is, with individualised marketing, segmentation is an embedded part of the process rather than something requiring separate segmentation research in advance. Individualised marketing's challenge to traditional target marketing about travel behaviour and hence segmentation research is explicit. For example:

In discussions with Brög [Socialdata's founder], he argues that the application of traditional social marketing focused on target audiences is not appropriate to change travel behaviour. (James, 1998, p. 639)

Through direct contact in an on-going communication process, people can be motivated more effectively to think about their daily travel. This personalised approach means that the information needs of people can be identified and provided in a very specific way. They receive only that information which they really need instead of a low-level "flood of material". Providing information tailored to individual situations is far more convenient and motivating, than having to filter through and select from multiple possibilities. (Brög, Erl, & Mense, 2002, p. 18)

### 2.4.2 Do consider how much value new data collection and analysis will add

Thinking logically about transport users (using existing data), planned transport changes, and expected changes in the transport environment may well suggest plausible segments. The question then arises as to how much extra value will be added by detailed segmentation research (and also whether segmentation research should aim to identify new segments, or more simply profile pre-determined segments suggested by the preliminary thinking).

For example, simply combining behaviour (e.g. level of use of targeted sustainable mode) with key attitudes (e.g. likelihood of switching modes) is often useful for thinking about possible segments. Splitting behaviour and dimension each into two levels produces the following four broad possible segments:

- Non-users with negative attitudes to switching
- Non-users with positive attitudes to switching
- Users with negative attitudes to continuing
- Users with positive attitudes to continuing.

Table 3 illustrates these four combinations in a behaviour/attitude matrix. It also shows that five existing segmentations by others (referenced in the footnotes at the bottom) built on contrasting conceptual foundations and bases can be seen as fitting into those same four combinations. This raises the question whether the more complex segmentation research methods often used to identify such segments add enough value to justify the extra effort of the substantial data collection and analysis.

**Table 3: Grouping segments by simple behaviour-attitude splits**

		ATTITUDE	
		Negative	Positive
DESIRED BEHAVIOUR	No	Pre-contemplators <sup>a</sup>	Contemplation & Ready for Action <sup>a</sup>
		Die-hard Drivers <sup>b</sup>	Malcontented Motorists; Aspiring Environmentalists <sup>b</sup>
		Unavailable <sup>c</sup>	Opportunity <sup>c</sup>
		Unavailable non-users <sup>d</sup>	Open non-users <sup>d</sup>
	Auto captives <sup>e</sup>	Potential riders <sup>e</sup>	
	Yes	Relapsers <sup>a</sup>	Maintenance <sup>a</sup>
		Reluctant Riders <sup>b</sup>	Car-less Crusaders <sup>b</sup>
		Vulnerable <sup>c</sup>	Committed <sup>c</sup>
Uncommitted users <sup>d</sup>		Committed users <sup>d</sup>	

<sup>a</sup> From stage of change framework, e.g. TravelSmart Victoria, 2003. 'Relapsers' are not a stage within the model, but are a recognized group related to change between stages.

<sup>b</sup> Anable (2005)

<sup>c</sup> Graham (2007)

<sup>d</sup> Booz Allen Hamilton (2005)

<sup>e</sup> Krizek & El-Genaidy (2007)



## **2.5 Do consider the size of your market (before spending on segmentation research)**

The size of the market also limits segmentation choices. A consumer marketing text warns:

Some industry experts insisted that segmentation is frequently unnecessary or uneconomical in the Australian and New Zealand marketplaces. With a relatively small combined population of less than 21 million people spread over a very large section of the globe, the costs of developing truly differentiated marketing programs frequently outweigh the benefits. (Lawson, Tidwell, Rainbird, Loudon, & Bitta, 1996, p. 31)

Smaller populations lead to more reliance on pre-determined segments and existing data (hence some approaches used in larger economies may not be suitable for Australia or New Zealand, particularly if working at a regional level).

Nevertheless some complex segmentation research has been widely acknowledged as successful even in a smaller economy like New Zealand (e.g. segmentation research for promoting physical activity which involved over 8000 respondents, factor analysis, cluster analysis and path analysis; Sullivan, Oakden, Young, Butcher, & Lawson, 2003).

## **2.6 Do aim to include factors known to be important from non-segmentation research**

Stated choice analyses that do not look like segmentation research at all can also deliver results relevant to planning for segments. For example, stated choice research with Auckland/Wellington/Christchurch commuters driving in the morning peak (O'Fallon, Sullivan, & Hensher, 2004) estimated their likely mode change in response to specified levels of several interventions (including cheaper PT; more frequent PT; faster PT; more cycle lanes; car tolls during peak times; extra parking costs). Results showed significant differences relevant to segmentation (e.g. whether driving a company-owned vehicle, whether driving as part of work that day, whether dropping children at school).

Such results raise awkward questions about much transport segmentation research. Stated choice analysis of mode choice often has similar goals to travel behaviour segmentation research. But the underlying methodological assumptions differ. More specifically:

- Stated choice results (like those mentioned above) cover factors that often seem left out of conventional segmentation research (e.g. segments created by cluster analysis of attitudes that ignore whether people have a company-owned vehicle, whether they drive as part of work, etc.)
- The responses to stated choice surveys seem better grounded in the reality surrounding transport choices than that of attitudinal segmentation research (because stated choice responses are typically related to a specific recent trip described in detail by the respondents immediately before their choices).

By not grounding choices in the reality of a specific trip (e.g. distance, load, weather, obligations to transport others), much segmentation research runs the risk of ignoring factors known to strongly influence mode.

Why does stated choice research often take such care to ground mode choice in the reality of a recent specific trip whereas segmentation usually doesn't? Sound reasons are not clear to us. This difference in approach may result more from unconsidered gulfs between disciplines (i.e. economics/transport planning vs. marketing/psychology) and statistical methods different professionals happen to be familiar with (e.g. cluster analysis vs. stated choice methods) rather than because the methods most familiar to marketers and social marketers are necessarily the best for segmenting sustainable travel behaviour.

More specifically, traditional methods of cluster analysis (e.g. the *k*-means procedure often used for segmentation) cannot easily handle yes/no variables (e.g. has company car? drives as part of work? drops children at school?). Thus to an undesirable extent, choice of statistical tools may be determining the choice of factors considered for segmentation. Furthermore, by ignoring such factors known to influence transport choices (such as company-car ownership) and by not grounding choices in the reality of a specific trip, much segmentation research may be leaving itself open to strong effects of acquiescence bias and wishful thinking.

## **2.7 Don't let wishful thinking drive your segments**

Reviewing several sustainable transport segmentations left us concerned that segments might be determined too much by factors only weakly related at best to actual transport behaviour. In addition to the arguments in section 2.6, it is useful to critically examine segments from existing studies.

For example, the Aspiring Environmentalist segment in Anable (2005) may typically agree much more than other drivers with statements like "Being environmentally responsible is important to me", but whether or not such differences are predictive of potential for future behaviour change is far from clear.

A substantial review of existing research and theory (Anable, Lane, & Kelay, 2006b) showed the complexity of the underlying issues. It specifically highlighted the attitude-behaviour gap, that is, that pro-environmental knowledge and attitudes often fail to be translated into pro-environmental behaviour.

For instance, people say they want to protect the environment, that clean air is important to them and that they are aware of the emissions produced by travelling in their car. Yet few consider emissions or fuel economy when they buy a vehicle. (Anable, Lane, & Kelay, 2006b, p. 62)

Locally, qualitative research in Auckland concluded that messages about 'public goods' or community benefits such as improving the environment should only be done in conjunction with personal benefits—by themselves, the public good messages were criticised as too vague (Forsythe Research, 1999). Our more recent qualitative research in 10 cities (Yockney, Comfort, Sullivan, & Wallis, 2009) concluded that this remains a sensible warning. Impacts of the sudden increase in fuel prices last year on actual behaviour were easier to detect than impacts of environmental concern on transport mode choice.

## 2.8 Do be wary when identifying those most likely to change, the 'low-hanging fruit'

Quickly assessing the likelihood of change is important in several travel behaviour change approaches. Likelihood of change is fundamental to the many segments listed in Table 3 above. Although users of such brief survey questions will rarely have illusions that they are perfect, qualitative research warns that responses to such questions may be less informative about real readiness to change than is probably often assumed.

The recruitment questionnaire for our recent qualitative research (Yockney, Comfort, Sullivan, & Wallis, 2009) included a related attitude rating:

Now can you please tell me how much you agree or disagree with the following statement:  
I would like to be able to use my car less.

Asking this question by phone for recruitment delivered quick responses just like a quantitative questionnaire. The qualitative research then gave us the luxury, not available to those interpreting normal survey responses, of spending two hours with that person getting to understand their travel motivations (and likelihood of changing behaviour) in much greater detail.

Most of our respondents had agreed that they would like to be able use the car less. But after lengthy discussion, very few seemed likely to actually reduce their car use regularly (unless there was a clear change in objective factors such as their place of work, fuel prices, obligations to children, etc.).

If agreement to questions like that in the recruitment questionnaire is not informing us much about their likelihood of change, what does it mean? Many could have been expressing their feelings accurately (e.g. they would **like** to reduce their car use because they know that might contribute to reducing emissions, improve their health by increasing physical activity, etc.). But the narrow constraints of the question did not allow them to express themselves more fully in ways such as:

- I'd like to use my car less, but I'm far too busy
- I'd like to use my car less, but I need to take my young children everywhere.

Although we had very few interviews with respondents who strongly disagreed with reducing their car use on the recruitment question, their responses do suggest another warning about the other end of the scale. One such respondent was very down-to-earth and bluntly spoken. Despite his initial 'strong disagreement', after thorough discussion, it emerged that he was one of the few respondents highly likely to change his regular transport mode without any clear change in 'objective' factors. Specifically, he was likely to start cycling to work in the summer. Note that he already cycled recreationally, had established personal reasons for keeping fit (being in good shape for pig-hunting and similar activities), had a workplace at a suitable distance with suitable roads, and had the kind of job where arriving a little sweaty would be no problem.

## 2.9 Do consider carefully how sustainable transport behaviour differs from other behaviour where segmentation is used

The practical aspects of transport behaviour change often sought (e.g. from car to public transport or to active transport) include things like getting familiar with bus routes/timetables/ticketing systems or making arrangements for alternative clothing and showers. This is much more demanding than many kinds of behaviour change (e.g. from buying shampoo brand A to buying shampoo brand B) that are the subject of common commercial segmentation research. Hence segmentation research for sustainable transport needs to differ to reflect the different kind of behaviour change targeted.

A recent workshop in Melbourne (Rigioni, 2007) provides a useful list of ways public transport segmentation is different:

- complicated product with more cross-sectional appeal than most consumer products (particularly products with a specific use or demographic appeal, e.g. power tools)
- socio-demographic factors don't define usage as much as they would for luxury or lifestyle products
- customer lifestyle is less relevant than in other industries (e.g. car industry)
- less scope for defining groups based on brand values—instead much depends on the utility of the service
- level of involvement<sup>2</sup> can vary greatly with PT (whereas many other customer decisions can be classified as high or low involvement); factors relating to level of access, time spent travelling, and the number of modal changes can have a major effect on how the product is considered
- customers can and will use PT regardless of their level of satisfaction.

Expanding the target behaviours beyond public transport to include walking, cycling, and ridesharing increases the extent to which segmentation research for sustainable transport differs (not to mention greatly increasing the potential complexity of developing segmentation research). If your objectives require segmentation research to concern multiple target behaviours, then consider multiple segmentations from the same dataset (rather than one segmentation about sustainable modes somehow aggregated). That is, the people interested in increasing cycling and situations where cycling is attractive may be quite different from the people and situations most relevant to increasing public transport use.

Hence detailed thinking about objectives for a sustainable transport segmentation may well suggest that a much larger total sample size is needed than for many other segmentations. One reason might be to ensure that sample size is sufficient to separately profile or segment those subgroups most likely to increase each sustainable behaviour of interest. Another

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<sup>2</sup> E.g. high involvement occurs when the decision is important to a consumer and hence they put substantial effort into gathering relevant information and/or weighing up the relative pros and cons of different options

reason might be because some see the growth opportunities for PT mainly in niche markets which are by definition small (Hensher, 2002).

## **2.10 Don't leave major scoping/planning issues to the vagaries of a competitive tender focused on data collection**

In short, solid foundations are needed for sound segmentation research, and jumping into questionnaire design as part of a tight contractual time-frame is unlikely to deliver suitably solid foundations.

To get solid foundations, we would normally suggest that the kinds of issues and questions raised in this paper be worked through thoroughly before a competitive tender for segmentation research is issued. Alternatively it would be reasonable to seek some competitive quotes for provision of scoping/planning advice explicitly separate from the data collection and analysis, or a tender combining both scoping and data collection (but where data collection and analysis costs must be allowed to vary substantially depending on the conclusions from scoping). From the bidder perspective, most of the financial risk in segmentation research is generally in data collection and analysis (because sample sizes are typically large and analysis relatively complex), hence they may pay relatively little attention to fundamental scoping issues (because they imagine that the client has dealt with these by the time of the research brief).

Because many of the issues and questions concern transport planning issues and objectives that are typically in the client domain rather than those likely to be familiar to several research companies, a tender that ignores careful scoping/planning is likely to result in diverse bids that conceal as much as they inform. For example, bidders may be in the awkward position of making huge judgements about how much scoping work remains to be done (with the least knowledgeable bidders then likely to suggest the lowest price because they will be less aware of the underlying difficulties).

In his first major public sector segmentation, the first author got a sharp lesson in how crucial solid scoping and planning can be. An established client approached us about segmentation research, clearly expecting us to propose a large survey of their clients (probably for analysis using cluster analysis or similar techniques). The budget would have quickly been into six figures. Fortunately for the client, an older and wiser researcher in the firm convinced them to first let us do solid scoping work for them, to cover fundamentals such as a suitable sampling structure for their complex customer base. By the time we had worked closely with them to dig into their customer database and think carefully about their objectives, good practical segments had been found. The big survey was never done. And the budget was well under six digits.

The anecdote above points to another lesson which is often relevant, the importance of close collaboration between researchers and operational people on the client side. Successful segmentation research typically requires closer teamwork than usual between client and provider. Such teamwork should be deliberately and explicitly built in at the start of the project. The need for close teamwork may often be greater with sustainable transport than other segmentation research, because of extra complexities common with sustainable transport.

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