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# Do preferences for BRT and LRT vary across geographical jurisdictions? A comparative assessment of six Australian capital cities

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ABSTRACT

Developing and updating public transport infrastructure is one of the most complex and far-reaching investment decisions for government. Better public transport and transport infrastructure generates benefits for users and helps manage urban congestion and climate change. This paper presents the results of a survey of residents of six capital cities in Australia to investigate potential jurisdictional differences and similarities in the support for BRT in the presence of LRT options, a common context in many metropolitan areas. We develop two best–worst preference experiments, one associated with design characteristics and the other with service descriptions, in which a number of statements about bus, BRT and LRT, are presented in sets of four, and respondents are asked to indicate which one they perceive as the best circumstance and which one they perceive as the worst. The sets of statements are varied across preference sets to elicit the role of each statement as an identified barrier against or in support of BRT and/or LRT. The main focus of the experiments is to assist in the development of a strategy to promote BRT and to break through the barriers that have created the modal misperceptions so common in many geographical jurisdictions. A survey of residents of six capital cities in Australia provides the empirical context. Ongoing research is extending the study to other locations throughout the world.



## 1. Introduction

Cities are the productive centres of modern economies where an efficient public transport system plays a critical role. Public transport (PT) modes serve many roles in cities throughout the world. Developing and updating public transport infrastructure is one of the most complex and far-reaching investment decisions for government. Better public transport and transport infrastructure generates benefits for users and helps manage urban congestion and climate change. It can facilitate the economically productive agglomerations of firms and improve accessibility to goods, services and activities, which is the ultimate goal of most transport activity.

Notwithstanding, the sheer size and scale economies of modern transport systems infrastructure are hugely expensive. It would seem appropriate that any debate about mode should follow a mode agnostic evaluation of need. A rational debate on the opportunities offered by different public transport (PT) modes in particular should ensure that best value for money is obtained in the choice of PT mode where the choice is made on objective grounds, ensuring the required service levels can be met and the contribution of the new infrastructure to the system as a whole delivers on key criteria such as connectivity, frequency and visibility within a network.

Many cities are looking to expand their PT network in response to growth in city populations and consequential increasing congestion. Aiming to encourage mode switch, the debates have focussed on comparing light rail transit (LRT) and bus rapid transit (BRT). However, despite many arguments promoting the advantages of BRT, there exists much resistance to BRT as an alternative to a rail solution. Perceptions appear to be at the root of the problem since the literature demonstrates that other factors, particularly quality in the form of frequency, have much more of an impact on ridership and ridership potential (Currie and Wallis, 2008; Hensher and Li, 2012) with a recent paper identifying that "Overall the results suggest that transit mode does not have a significant ridership effect, at least in regards to boardings per vehicle kilometre" Currie and Delbrosc (2013) p59. Perceptions seem to affect all stakeholders and importantly the decision-makers, as a shown by the following quote from *The Atlantic Cities* (July 8 2013).

> "When the city of Wellington, New Zealand, decided to expand its public transit system, Mayor Celia Wade-Brown initially favoured light rail as the so-called sexy option. Then the project

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estimates came in. According to the *Dominion Post*, the capital budget for light rail came to $940 million, while those for bus rapid transit came to $207 million. And this despite the fact that BRT was expected to reap a greater return for the city. That was enough to convince Wade-Brown, who subsequently called BRT "nearly as sexy as light rail and a lot cheaper."

This suggests that the growing challenge is not to focus on the 'hard' characteristics of the different modes, but to instead understand why stakeholders prefer one PT mode over another. Moreover, in understanding why preferences exist – stakeholders frequently and overwhelmingly support LRT, regardless of whether they themselves use a specific mode (Hensher et al., 2013a, 2013b) – it is also important to know whether this varies by jurisdiction. Understanding these two key characteristics of perceptions would allow information to be properly targeted to correct misperceptions and to provide correct information appropriately. The aim of this paper is to understand, from the wider population of stakeholders, whether the barriers that mitigate against support for BRT in the presence of LRT options vary spatially between jurisdictions.

The approach developed to understand perceptions and biases involves two stages; the first is a best–worst preference experiment in which a number of statements about public transport with reference to specific modes (BRT, LRT), are presented in sets of four. Respondents are asked to indicate which one they perceive as the best circumstance and which one they perceive as the worst. The sets of statements are varied across preference sets to elicit the role of each statement (up to a probability) as an identified barrier against or in support of BRT or LRT. This exercise provides a way of narrowing down the numerous factors that could influence an individual's perception of BRT and LRT. This paper presents the results of a survey of residents of six capital cities in Australia to investigate potential jurisdictional differences and similarities. Ongoing research is extending this study to other locations (cultures and languages) throughout the world.

The paper is organised as follows. The identification from the broader literature of the factors that influence stakeholders views on the appeal (or otherwise) of LRT and BRT, distinguishing between those factors associated with design of a PT system, and those associated with service delivery is examined in the first section. Against this background, the attributes selected for this study are discussed followed by a discussion of the sampling process, data collection, the best worse methodology and model estimation. Following the model estimation, results are presented for the six Australian cities, where exposure to BRT and LRT varies, broadly categorised to visually compare and contrast the perceptions of residents in the different cities. This is followed by a regression analysis to try and understand the observed differences. The concluding section summarises the main findings, which provide the basis of understanding and responding to observed differences in the barriers mitigating against and for BRT in the debate on BRT versus LRT.

## 2. Identifying key influences on preferences for BRT and LRT

The focus of this study is on the informed or uninformed perceptions of the wider population of stakeholders, regardless of whether they are actually a user (frequent or infrequent) of various available forms of public transport. Two sets of attributes have been identified – attributes which relate to the design of a bus based and a light rail based transport system, and attributes that relate to the service levels offered by bus and light rail based systems.

Studies were selected from a very larger literature, including a grey literature presenting more strategic overviews of the merits of BRT and LRT. This included a review of the more technical papers by Hensher (1991), Swanson et al. (1997), Cirillo et al. (2011), dell'Olio et al. (2010a,b), Eboli and Mazzulla (2010, 2008a, 2008b), and Marcucci and Gatta (2007), and the strategic studies of Hass-Klau and Crampton (2002), Hensher and Waters (1994), Hensher (1999), Mackett and Edwards (1996a, 1996b), Canadian Urban Transit Association (2004), Cornwell and Cracknell (1990), Kain (1988), Pickrell (1992), and Sislak (2000).

From this review of the very wide and varied literature on PT design and service provision, a list of statements was developed which was piloted (and further refined) before being used in a survey across six Australian capital cities. These are shown in Tables 1 and 2 below. As the survey was part of a best–worst experiment, the statements shown in Tables 1 and 2 (which show statements favouring bus or BRT) were also reversed in the experiment to statements favouring rail or LRT. In total, 110 attributes were used in this aspect of the best–worst experiment.

The next section describes how the empirical data was collected, which provides the basis for identifying information on the barriers that exist in the population as a whole, and allows an investigation as to whether these barriers vary by jurisdiction.

## 3. Method, sampling, data collection and data profile

Given the candidate potential barriers, as described by the statements in Tables 1 and 2, a framework in which to identify stakeholder preferences as a representation of the role that each statement plays in positioning their support for LRT and BRT is required. Although there are a number of methods available to elicit preferences, this paper is based on a ranking from an iterative set of best–worst choices. Hensher et al. (2013a) provides more details as to the advantages of this approach, and provides more detail on the methodological framework

An illustrative preference screen is given in Fig. 1 for the design experiment with similar screens being developed for the service element of the experiment. Of note are the pictures in the screenshot, which are part of specially designed images (two images of BRT (standard and modern) and two images of LRT (standard and modern)) where it is only the vehicle that varies to minimise potential bias from background features.

To obtain a broad assessment of the interest in the role of BRT and LRT in the provision of metropolitan public transport, six Australian cities (Sydney, Melbourne, Canberra, Adelaide, Brisbane and Perth) were selected, as their residents have been exposed to real BRT and/or LRT systems as well as, to varying degrees, the debate on proposals to promote LRT or BRT.

Given growing evidence that a consumer panel can deliver a representative sample if appropriate quota criteria are applied (see Hatton MacDonald et al., 2010; Lindhjem and Navrud, 2011), we have drawn on the Pure Profile panel (www.pureprofile.com) for Australia which has many thousands of participants in the chosen study areas. Pure Profile have over 350,000 individuals in the Australian panel, and will not undertake a project if there is a belief that the target sample is unachievable. Pure Profile paid each respondent $10 for a completed survey.

An online survey was developed that included the best–worst preference screens, four for each of the service and design statements associated with LRT and BRT. In addition, questions were asked on recent public transport usage, and socioeconomic descriptors of the respondent (as summarised in Table 3). Interviews commenced on 16 May and concluded on 5 June 2013. The final number of interviews are summarised by City in the first row of Table 3. With 4 best–worst scenarios, the actual data used in model estimation is four times sample size.

The socioeconomic profile of the sample across the six cities shows a very similar mix of stakeholders in terms of average age