

Comparing operator and users costs of light rail, heavy rail and bus rapid transit over a radial public transport network

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A model to compare three alternative forms of public transport – light rail, heavy rail and bus rapid transit - is developed for an urban network with radial lines emanating from the borders to the city centre. The theoretical framework assumes an operation aimed at minimising the total cost associated with public transport service provision, which encompasses both operator and users costs. The decision variables are the number of lines (network density) and the frequency per period for each mode. This approach has no prejudices a priori in respect of whether a specified delivery scenario is aligned with existing modal reputation. Rather, we establish the conditions under which a specific transit mode should be preferred to another in terms of the operator (supply) and user (demand) side offerings. The model is applied using data from Australian cities, suggesting that in most of the scenarios analysed a high standard bus service is the most cost-effective mode, because it provides lower operator costs (infrastructure, rolling stock and operating cost), access time costs (due to a larger number of lines) and waiting time cost (due to larger frequencies of operation). A railmode, such as light rail or heavy rail, may have a lower total cost only if it is able to run faster than bus rapid transit, and the difference in speed is enough to outweigh the bus advantage on operator cost and access and waiting times.

Keywords: BRT, Bus Rapid Transit, Frequency, Heavy rail, Light rail, Number of lines.

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