The economic value of stay time

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Abstract

This paper presents a new method to value the use of place, namely in terms of stay time of visitors using the place. Places where more people stay longer, that is, increase their stay time, are more valuable than places where people choose not to spend their time. The stay time reflects the quality of a person's experience at a particular place, and the better the quality of experience, the more they are likely to travel and stay there, which is important when planning strategic infrastructure. This value is also increased when there are many people using the place for a longer amount of time. In summary, we estimate the use value of a place as the number of person hours for which people stay, multiplied by the value per hour of stay time.

Transport economics professional practice has focused primarily on valuing movement rather than place; however, this favours places that people move through quickly, rather than places where people linger. Economists have valued destinations using the travel cost method. A few studies have combined the value of destination with duration of stay in days, to infer the average value per day of staying at the destination. This paper extends that analysis to infer a Base Case value per hour of staying in a place, which can then be used to value Project Case interventions that increase the use of the place.

The paper presents two specific case studies drawn from actual benefit cost assessments.

1. Introduction

Increasingly, there is a shift towards infrastructure incorporating holistic, customer-focussed solutions to maximise its value to the community. We are seeing increased focus on place as well as movement as demonstrated by the NSW government's introduction of the Movement and Place Framework in (NSW Government, 2021). The framework acted as a cross-government guideline for planning and managing roads and streets across NSW, with an emphasis on balancing the movement of people and goods with the amenity and quality of places.

One way to measure the incremental value an individual has for a particular location is the travel cost to that location compared to other locations. The next step is to measure the duration of an individual's stay in that place and attribute the travel cost to the duration of stay. This gives a value per unit of stay.

It is important to understand that the value of stay time is calculated in the Base case, that is, before project interventions. It can then be used to value project interventions that increase voluntary duration of stay. It is also important to understand that stay time is an incremental value of place, that is, the value that an individual has for staying in a specific location compared to all other locations. It can therefore be applied directly in the Project case to value longer stays. It is important to include the incremental value of place as well as movement, for balanced appraisal of infrastructure investment.

Reviewers have noted that other measures of amenity include stated preference, hedonic pricing and avoided health costs. We used these measures in the case studies below, but not to measure use value. Revealed preference in terms of base case travel cost attributed to duration of stay is the most appropriate measure to value Project case interventions that increase use of the destination place.

2. Related works

Several methods to value the economics of stay time specific to place have been reported in literature. Travel cost method (TCM) has proven to be the most popular revealed preference-based approach used over the past 30 years for placing values on recreational use based simply on actual visitor behaviour measured in number of trips (visits) taken, and related individual expenditure on marketed commodities and time travelling (the trip price) as an indirect means of revealing individual preferences (Mendes and Proenca, 2009).

In 2020, Driml estimated the value of national parks to the Queensland economy through the collection and analysis of primary data from surveys of national park users, combined with secondary tourism data. The team calculated the annual value added and jobs supported, direct and indirect, from additional tourist expenditure attributable to national parks. The methodology included the application of an adapted TCM to estimate the non-market values consumer surplus (CS) to direct users of the parks for recreational purposes. The CS per-day is the Marshallian economic measure of recreation value and is measured through the difference between the individual's willingness to pay and the actual recreation expenditure the individual outlays. The study suggests that the equivalent of $6.3 in benefits are generated per $1 spent on national park visitor management each year, highlighting the implications for government funding of national parks management and conservation.

The study emphasized that understanding the economic value of public places is important for several reasons. As national parks are publicly owned and generally have no, or low access prices, their economic value is not revealed in the market. Therefore, the importance of national parks as economic assets can be overlooked unless deliberate economic valuation is undertaken and reported. Decisions about levels of human use or the best uses of natural environments should be informed by understanding of their economic, social, and environmental significance (Driml, 2020).

Mendes has studied the economic recreation value to visitors of a National Park in Northern Portugal. The initial study was published in 2005 and discussed an on-site individual observation Travel Cost Model, Count Data distributions, and a version of hyperbolic discounting framework distribution (Mendes and Proenca, 2005).

Continuing this study, a paper from Mendes in 2009 looked at applying count-data travel cost methods to a truncated sample of visitors to estimate the average CS per each day of an individual visiting the Peneda-Gerês National Park to enjoy the natural facilities for recreation. The methodology uses a single, on-site individual recreation demand function to estimate the average marginal (daily) CS of a visitor. The dependent variable is the number of days spent per visit (i.e., per trip) as a function of the price (cost) of each recreation day per trip (Mendes, 2009).

This study was the first attempt to quantify the recreation benefits per day of stay supported by a national park. The study emphasized the need to correlate an economic value to stay time

based on days. Our methodology aims to build on this and look at the value on an hourly basis, so we can value interventions that increase the number of hours that people voluntarily use a specific place.

In 2019, a similar study was undertaken to analyze the recreational demands that influence tourists' visits and the recreational value of tourism of the Huisun National Forest Recreation Area (HNFRA) in Taiwan. They raised the idea that recreational demand and the willingness to consume has a direct impact on the recreational value. The study concluded that enhancing the site's recreational value would be beneficial to ecotourists' experiences and the management of HNFRA.

In 2019, the NSW Government introduced the NSW Movement and Place framework. The framework delivers on NSW policy and strategy directions to create successful streets and roads by balancing the movement of people and goods with the amenity and quality of places (Transport for NSW, 2021). We believe that this framework could be strengthened by explaining how to value greater use of place, in terms of additional hours spent in place.

3. Methodology

3.1 Overview

We enhanced the above approaches of using the Travel Cost Method and data on duration of stay, to use hours rather than days. This has become feasible with more detailed data available from electronic devices such as mobile phones.

By choosing to spend time and possibly money to travel to a given place, an individual reveals the minimum value that they have for the destination. By choosing to stay for a number of hours, an individual expresses the quantity of the place that they wish to consume. The ratio of value of place divided by quantity of place consumed (measured as hours) is an average measure of value of the place for the individual. Naturally this is an average value – but transport economics currently uses an average value for travel time, so it is appropriate to use an average value of stay time.

In mathematical terms, the value of stay time for a given visit can be expressed as:

$$Value\ of\ stay\ time\ (\$/hour) = \frac{Travel\ costs\ incurred\ to\ reach\ place}{Amount\ of\ time\ (hours)\ spent\ at\ place}$$

It should be noted that this would be a conservative estimate and is, in effect, the minimum willingness-to-pay. It would be expected that some or all the visitors will enjoy benefits that are larger than their travel cost of getting to the place.

It is important to note that the method estimates base case value of stay time, which can then be used to estimate the value of interventions that increase stay time, such as increasing amenity that leads to greater use of place.

3.2 Travel cost

The economic value of stay time can be calculated from the travel costs incurred by people to arrive and return from the specified place. This calculation is familiar to traditional transport economic methods.

It is important that the dataset of travel cost is consistent with the dataset of stay time. Aggregated data was used to maintain privacy of users.

The following chart shows aggregated monthly value of visits to a place in Sydney, namely Sydney Park, based on mobile phone data. This is discussed below in Sydney Park Junction case study. The value was based on time cost only, as actual, or perceived costs, were not available.

Figure 1 Aggregated monthly travel costs of visits to Sydney Park, based on phone data
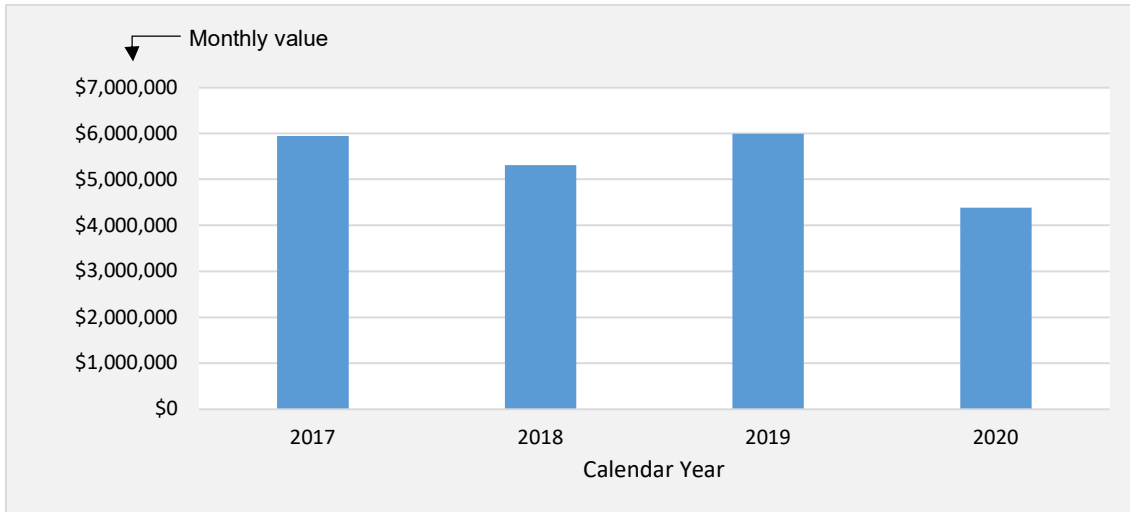
3.3 Stay time

The new part of our methodology was to use data on stay time in hours. This data has become available from mobile phones, subject to appropriate privacy protections that typically require aggregation of data.

Figure 2 shows distribution of average number of hours per visit to Sydney Park during weekdays, for stays up to 8 hours duration in 2017 to 2020. Longer stays were excluded as they may have comprised people who lived in the vicinity. The average number of hours per visit decreases exponentially with duration of stay, as shown by approximately straight line plotted on log scale. There were fewer stays in 2020 due to COVID restrictions.

Figure 2 Distribution of hours per visit at Sydney Park, for stays up to 8 hours duration
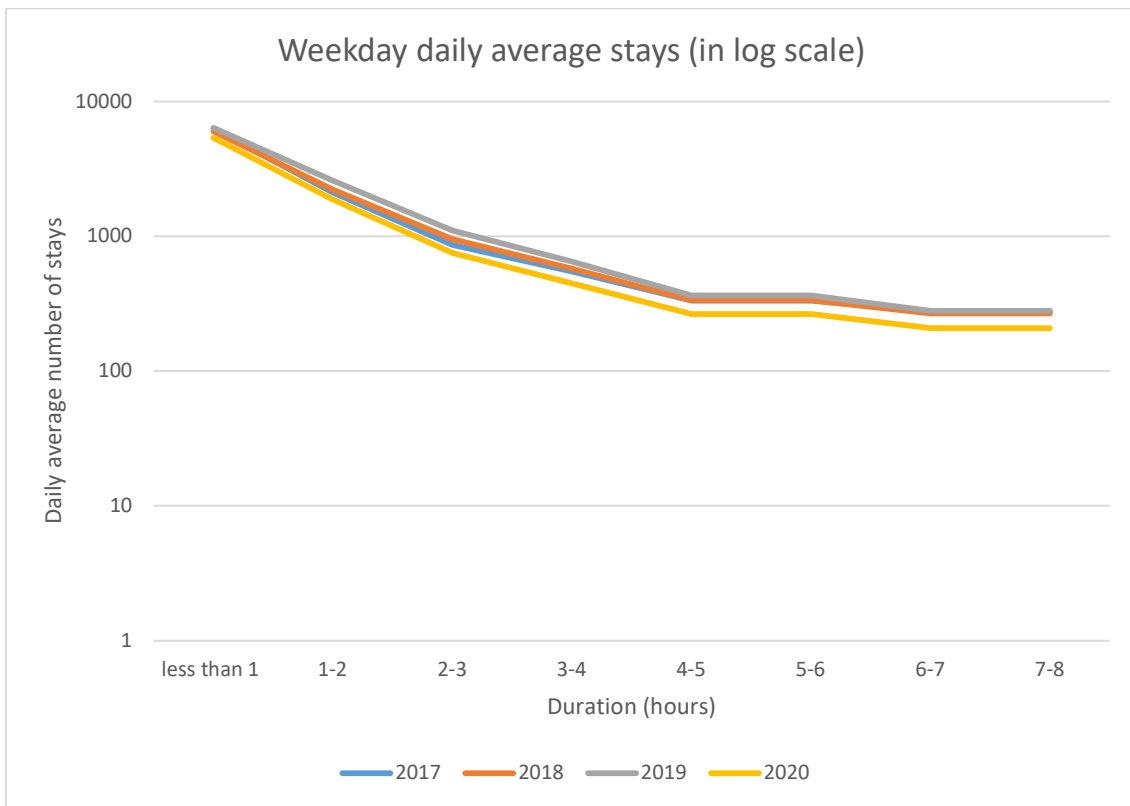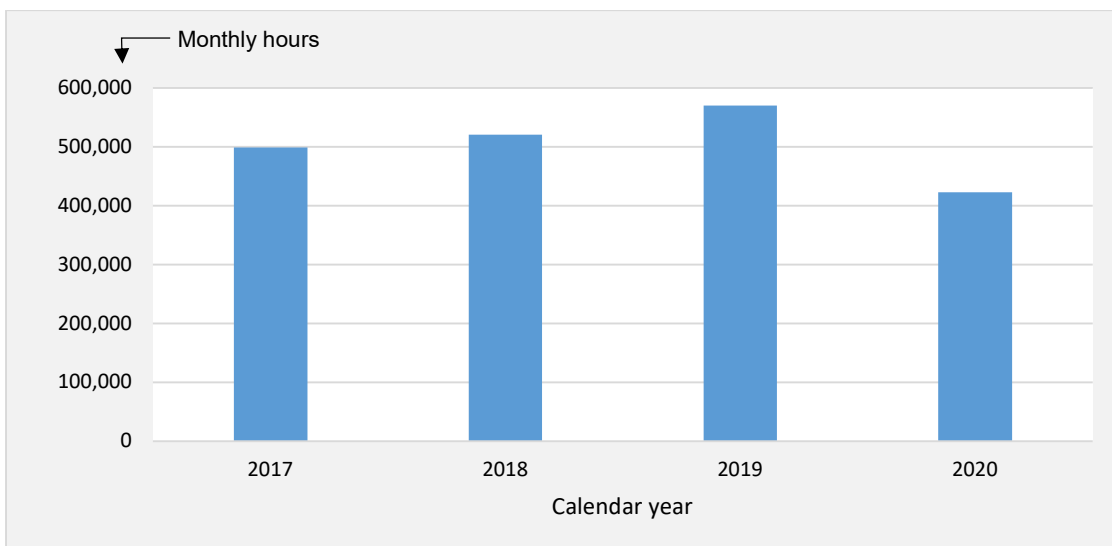

Figure 3 shows total number of hours for stays of up to 8 hours, averaged per month. There were fewer total hours per month in 2020, due to COVID restrictions.

Figure 3 Number of hours per month on average spent at Sydney Park, for stays up to 8 hours duration

We calculated the average value per hour of stay time from the above aggregates. It would be preferable to calculate the value per hour at an individual level, by dividing the travel cost for a person by their stay time. However, data from mobile phones is not available at an individual person level, so analysis to date has been aggregated.

The following chart shows alignment across years, with a single value of stay time.

Figure 4 Alignment across years, with a single value of stay time
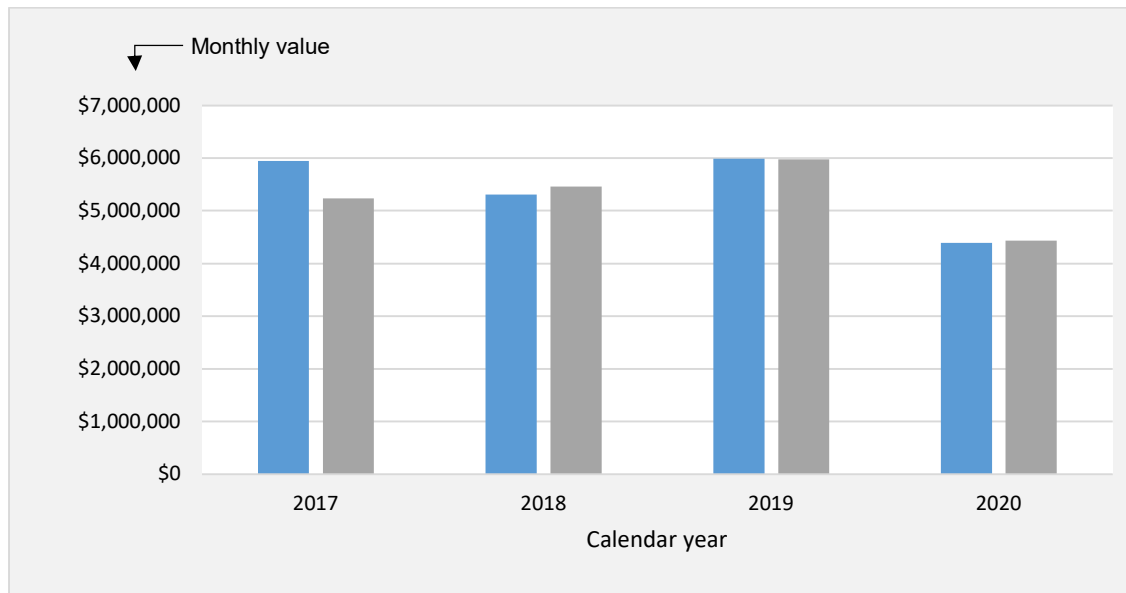

4. Case studies

We applied the above method in two cost benefit analysis projects: Sydney Park Junction precinct and a precinct in a popular holiday location in southeast NSW.

4.1 Sydney Park Junction

The Sydney Park Junction project aims to deliver transport infrastructure upgrades to enable urban and landscape design to improve the community amenity of Sydney Park, after roads near the park were diverted underground as part of Westconnex. The project ensures that transport networks not only support the movement of people, goods and services, but also have various place functions that support a range of socioeconomic activities. The Sydney Park Junction project endeavours to increase the utility of space through the introduction of dynamic community areas, as well as the promoting active transport.

The benefit-cost assessment for Sydney Park Junction has not been published, but the project has been subject to public consultation and is currently being implemented (Transport for NSW, 2021).

Figure 5 Key features of Sydney Park Junction (Transport for NSW, 2022)
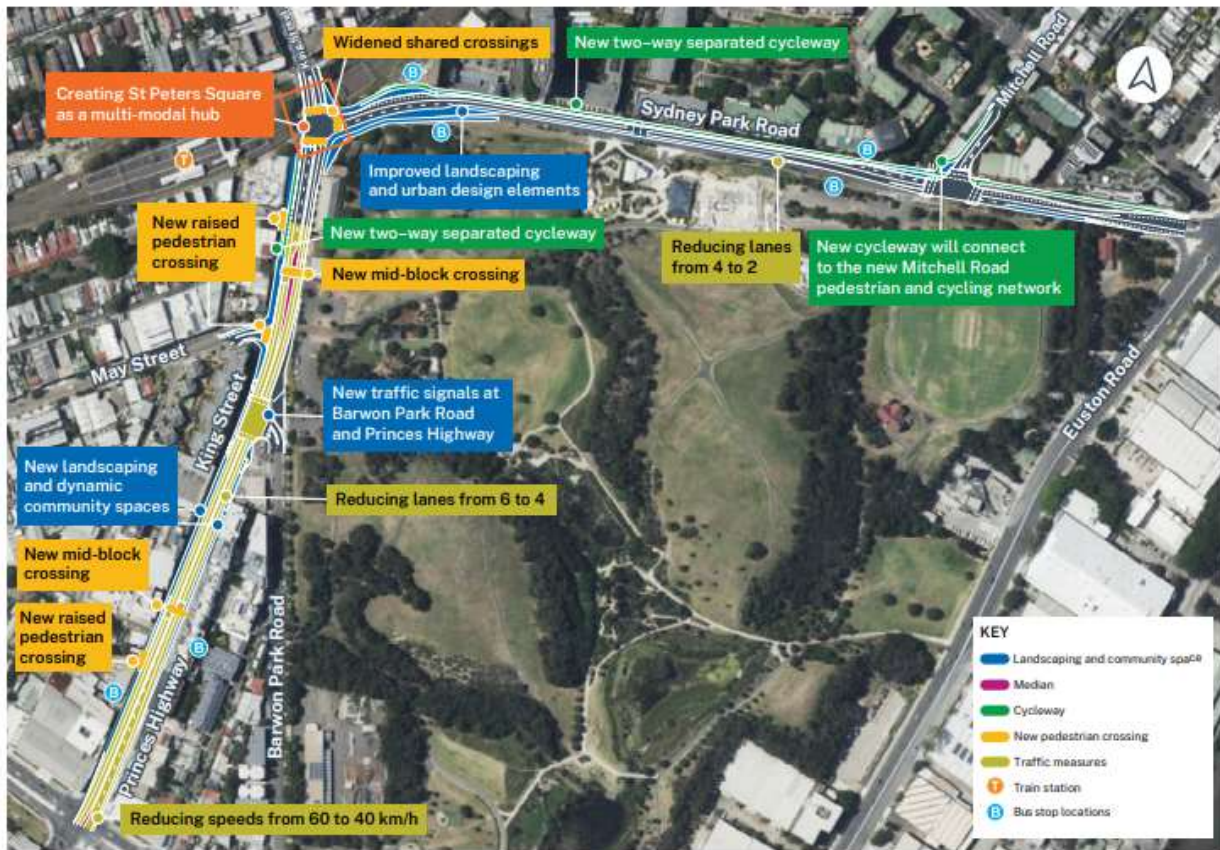
The team undertook an economic assessment of benefits aligned with relevant TfNSW guidance, including *Movement and Place Evaluation Guide 2020*, which provided guidance on estimating placemaking impacts of transport projects in business. For example, included as an economic benefit of the project was 'Better use (increased pedestrian activity)'. The 'Better use' benefit was measured as economic value of increased (pedestrian) activity, although we focused on people staying rather than walking as was done in Tsai (2019). The project proposed dynamic community spaces (DCS) to encourage visitors to stay longer.

Dynamic community spaces will help transform "roads" dedicated solely to vehicular traffic into "streets" accommodating a multiplicity of community use, from temporary food trucks or entertainment, to permanent structures built by businesses or local councils. Transport for NSW (2022). *Sydney Park Junction* shows various use of dynamic community spaces including food trucks or mobile eateries, local events or entertainment, seating arrangements to provide outdoor options and respect Covid-19 regulations. It was therefore important to value the additional time that people would stay in place using dynamic community spaces.

We estimated that dynamic community spaces would encourage more people to stay longer in the recovered road space, by benchmarking stay time in comparable spaces elsewhere. We multiplied additional hours of stay time by the Base case value per hour of staying at Sydney Park to estimate the benefits from enticing people to stay longer.

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4.2 Holiday destination in southeast NSW

Aurecon was engaged by the NSW Government to carry out the cost-benefit analysis for improvements to a precinct in a holiday town in southeast NSW. A key component of the project was the improvement of public spaces within the town centre, which included the creation of new event spaces, pedestrian areas, public seating, and parks.

The economic value of these improvements was assessed by estimating the additional stay time they would generate amongst visitors from the rest of NSW. The benefit associated with any additional out-of-state visitors attracted by the improvements was calculated separately.

To estimate the average value of stay time for time spent in the town, it was necessary to first estimate the average amount of leisure time available to visitors from the rest of NSW.

Assuming 8 hours are lost to sleep each night, there are 16 available hours for leisure activities per visitor. It should be noted that this is conservative, since some waking time must still be allocated to regular tasks like eating, for example. NSW visitors to the town were split between overnight visitors, who visit for 3.6 nights on average based on survey data from Tourism Research Australia, and day trip visitors, who typically travel from other nearby centres. It is therefore assumed that:

- Overnight visitors have a total of 16 hrs/day x 3 full days of leisure time in the town, which adds up to 48 hours of total leisure time per visit (note that the half night is lost to account for travel).

- Day trip visitors are assumed to have only 10 hours per day of leisure time in the town, accounting for up to 6 hours of round-trip travel time.

The travel costs can be estimated based on the weighted average travel time and distance for visitors to the town (to estimate vehicle operating costs). Origin-destination data for visitors attending the town from the rest of NSW was sourced from Tourism Research Australia and was used to estimate the weighted average travel time and distance for overnight and daytrip visitors to the town.

The following assumptions have been applied when estimating travel time, distance, and costs:
- All visitors travel to the region via private vehicle, with a value of travel time of $18.04/hr (escalated TfNSW figure from June 2019).
- For every 2 hours of drive time (as estimated by Google Maps direction assistant), travellers will undertake 0.5 hours of rest stops.
- Travellers from Sydney, Newcastle, and the Blue Mountains will experience 1 hour of congestion on average, in addition to the base travel time suggested by Google Maps.
- Each private vehicle will carry on average of 2 people.
- Vehicle operating costs (including fuel, maintenance, and depreciation) are taken as $0.27/km based on escalation of standard TfNSW parameters. Costs are to be shared evenly between vehicle occupants.

The resulting weighted average leisure time spent in the town is 46.8 hours, based on the ratio of overnight to day trip visitors of 29.8. The average round trip travel time is 12.7 hours, and the average round trip distance travelled is 939 km.

The total costs incurred travelling to the town by the average visitor are therefore:

- Value of travel time = 12.7 hrs x \$18.04/hr = \$227.8/visitor

- Vehicle operating costs = 939 km x \$0.27/km = \$253.6, or \$126.8/visitor (2 visitors per vehicle)

The total costs incurred per visitor are therefore \$298.2 per person, and so the economic value of stay time for visitors to the town is:

$$Value\ of\ dwell\ time\ (\$/hr) = \frac{\$354.6}{46.8\ hours} = \$7.6/hr$$

We estimated that improving amenity would encourage more people to stay longer in the precinct, by benchmarking stay time in comparable spaces elsewhere. We multiplied additional hours of stay time by the value per hour of staying in the precinct to estimate the benefits from enticing people to stay longer.

5. Conclusions

We use the revealed value of stay time in the Base Case to value Project Case interventions that increase the amount of time that people want to stay in a place. As done for Sydney Park Junction and holiday precinct, we estimate the additional stay time induced by the Project Case intervention and then multiply additional stay time by the Base Case value of stay time to value the interventions.

It is premature to state a standard value of stay time. The value per hour of stay time in a place depends on the quality of the place, so further studies are needed to characterise what drives value of place. Ideally, results will continue to be published, such that both the professional and public communities understand the value of place, how to improve value, and how to trade off movement and place.

Economics professional practice should focus equally on the value of place and the value of movement, to balance the needs of people who want to linger in a place, as well as people who want to move quickly through a place.

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