EFFECTIVENESS OF T2 PARKING FOR THE BUSWAY AND WHARVES IN NORTH SHORE

Keenan Lim

Department of Civil and Environmental Engineering
University of Auckland, Auckland, New Zealand

Abstract

This research looks at the Effectiveness of the T2 parking for the Bus way and Wharves in North Shore. The main objective of this research is to determine the understanding of drivers on T2 parking and the level of compliance of drivers with the T2 parking. From the interviews results which reflect the thinking and behaviour of the parking users, more than 80% of them are familiar with the T2 parking and the awareness of its location in the respective is also high. The five carpooling factors are time, convenience, location, people factor and cost. In Albany, the main factor for carpooling is cost whereas in Devonport and Birkenhead, people factor becomes major. People only consider carpooling if their schedule is adjusted by no more than 20 minutes. The main factor for non-carpooling in all three sites is inconvenience. More than 60% of the non-carpooling users are willing to consider share ride give that their problems for being unable to carpool are ideally solved. A few recommendations are suggested to be implied on the existing car parks which include expansion of T2 spaces, providing parking vacancy indicator, penalty fine and rearrangement of car park. Overall, all the T2 parking are fully utilised and effective for carpooling which can promote the use of public transport.

1. Introduction

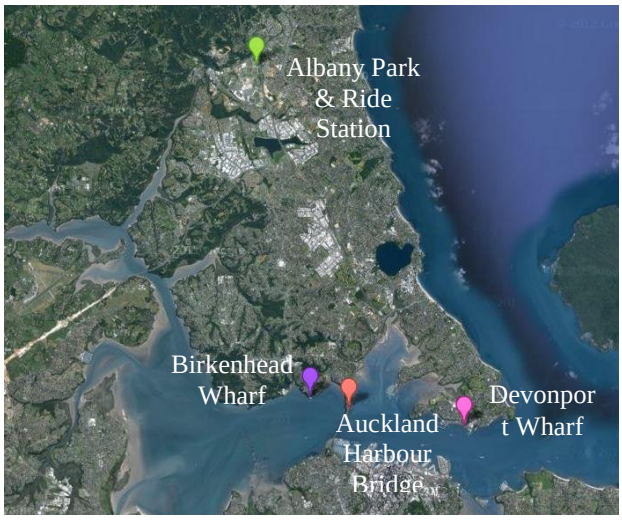

Figure 1: Location of the three parking sites with Auckland Harbour Bridge as reference point

Traffic congestion has become a major concern to worldwide particularly in major cities. Parking in Auckland central city is geographically constrained. To counteract with the problem there were a number of strategies introduced and one of them was the promotion of public transport. As a strategy to increase public transport usage, Auckland Transport implemented the 'T2 Parking'. T2 parking is a preferential parking for high occupant vehicles which provides 'more convenient/closer' parking to encourage carpooling during morning peak. The T2 Parking provision applies from midnight to 9:30am. This research is to study the effectiveness of the T2 parking at the Albany Park and Ride station, Devonport Wharf and Birkenhead Wharf in North Shore, Auckland. This report only considers the results and feedback based on the parking users from the three parking sites.

2. Literature Review

2.1. Preferential Parking Implementation

Parking problems are quite significant in almost every major city in New Zealand and internationally. It is well known that the limited parking availability will lead to several issues such as roadway congestion, air pollution and driver frustration. As strategies to solving transportation and traffic congestion problems, vehicles trips have to be reduced for more efficient use of transportation resources (Dorsey, 2005). The strategy

include shirting solo drivers to carpool or transit, allowing more employees to work at home, or adjusting work schedules to avoid peak period auto travel (Giuliano and Wachs, 1992).

Park and ride gains its popularity after it became a means for the suburban as well as city's residents to gain access to public transport such as bus and ferry services (Wang et al., Sept 2004). Another strategy is to provide high occupancy vehicles (HOVs) with an advantage over small occupancy vehicles (SOVs) on congested roadways… Preferential parking has been a suggestion that will probably increase the passenger usage of the park and ride areas thereby improving parking efficiencies and hence increasing patronage on buses and ferries (Anthony, 2004).

2.2. International Experience with Preferential Parking for HOV

The majority of international references to HOVs put them in the context where they were seen as a means of undertaking the whole journey as an alternative to or substitutes for a bus or single occupant car trip. Therefore, the majority of references to preferential parking for HOVs focused on municipal parking in a town center, or on travel planning for individual workplace sites. However, there doesn't appear to be a great deal of international experience of specifically encouraging HOVs as a means of travelling to a park and ride facility (NSCC, 2010).

HOVs were generally seen as a means of undertaking the whole journey as an alternative to or substitute for a bus or car trip. Up to date, only a few instances of providing preferential parking for HOVs at park and ride facilities were found in web search. There were all in North America, two in California; one in Florida and one in Canada. Each of these was at a fairly low scale and two were trial projects. The majority of these trials required drivers to register either their vehicles or themselves and their passengers, and to display passes on their vehicles when parked in the preferential parking spaces (NSCC, 2010).

There was also some evidence showing that Australia implemented the trial. Minister for transport, Mr. Cox was asked by the Sydney City Council to introduce a trial preferential parking scheme for residents in the south Paddington area (October 26, 1976).

2.3. Preferential Parking Trial in North Shore

The idea of preferential carpool parking only arrived in New Zealand in the early 2010. Since the Northern Express bus service was introduced with the opening of the Albany and Constellation Bus way stations in 2005, patronage on the bus service has developed a constant growth (NSCC, 2010).

With the increasing usage of park and ride facilities at the Albany Bus way Station, Devonport ferry wharf and Birkenhead ferry wharf, the North Shore City Council (NSCC) has trialed a scheme which recommends the a methodology for preferential parking that aims to fully utilize the car parks available and to get more passengers on ferries and buses. Preferential parking for about 68 HOVs with two or more people will be introduced at the Albany Park 'n Ride Bus way and 28 HOV carpool parks at the Devonport wharf for weekday commuters (AKTNZ, 2010). The offer of preferential parking is intended as an incentive for commuters to find a passenger for their car, or to become a passenger in another car by travelling with someone else (NSCC, 2010). This will have the effect of achieving a higher level of passenger patronage on the related public transport service, yet without increasing the present parking spaces or inducing any other additional traffic movements in the area. A trial of preferential parking at these two sites can be carried out, with appropriate education and marketing, signage, and finally enforcement. The recommended trail would allow the number of spaces reserved for HOVs to be increased or decreased depending on demand and uptake (AKTNZ, 2010). The key factors in the trials include the limited supply of park and ride spaces at these locations, research indicating HOVs could form in these areas and access to regular high quality passenger transport (NSCC, 2010)

The criteria that qualified a vehicle as a complying participant in this scheme is that the vehicle arrives carrying at two people and parks for a certain amount of time whether a short of long term. Thus legitimate users of the scheme were both those drivers who arrive together with the required number of people in the car who all dismount and use the public transport service (long term parking), and kiss-and-ride vehicles (short term parking), again with required at least two people in the car on arrival (NSCC, 2010). This criteria simplified recognition of qualifying vehicles, as trying to distinguish between short or long term parkers is not possible from direct observation of the vehicle at any entry 'check point'' prior to the vehicle becoming stationary in the car park and its occupants dismounting. Some HOVs have been seen to arrive and park, one passenger departs to use a public transport service, while the other sits in the car and reads for a while before catching a later service. This is complying behavior (NSCC, 2010).

Likewise use of the scheme by car poolers at Devonport (who then travel off the site) is complying provided the car that remains parked was a complying HOV. Since

the use of the scheme by car poolers is likely to be minimal this use is not considered to be detrimental. If it proves a popular use, however, then it may be that some parking spaces at the more remote end of the parking area could be allocated for that purpose, distinct from the preferential parking intended to serve the public transport activity (NSCC, 2010).

The Albany site is limited for use by bus patrons only and that over-riding requirement will remain for all parks in the Albany Bus way Station Park and ride car park. Observations of kiss-and-ride behavior at Albany and Devonport find that there are seldom more than two kiss-and-ride vehicles discharging at any time in any case, and so this mode does not represent any 'threat' to the scheme's main emphasis of providing longer term parking for HOVs (NSCC, 2010).

The criteria refers only to arriving vehicles because experience and observation confirms that in many cases a group of people who have contrived to carpool for the journey to work have different travel demands for the homeward journey. Thus the departing vehicle may in many instances carry fewer than the qualifying number of people. This effect does not detract from the preferential parking scheme's objectives, as it is believed that the returning passengers frequently utilize public transport from the station/ terminal to complete their return journey (NSCC, 2010).

3. Methodology

3.1. Traffic survey

Early morning surveys were conducted at each of the bus station and wharves from 6:30am till 9:30am. The surveys ran for two days per week (Thursday and Fridays). Two persons conducted the survey and to ensure higher efficiency and accuracy and each survey was separated into two parts:

a) One measured the occupancy of the car park:
   - Number of arriving and leaving vehicles were recorded
   - Number of passengers (including the driver himself) were recorded

b) The other measured the compliance of the T2 parking users:
   - Whether users were using it at the right manner
   - Number of dropping off vehicles were recorded

Once the T2 spaces had been filled, the time was recorded and any high occupant vehicles that entered the car park would be counted as extra demand. In case where the T2 parking did not get full by 9:30am, the survey came to a halt and the remaining vacancies were recorded (Chu, 2012).

3.2. Direct Interviews

Interview questionnaires regarding the awareness as well as the compliance with the T2 parking were conducted after the traffic survey. However permission from the Ethic Approval was needed before any interview could commence.

3.3. Data Analysis

- Extra demand and the non-compliance of the T2 parking were determined based on the traffic surveys count
- Data form the interviews on parking users were analysed to examined their knowledge and thinking behaviour on the T2 parking

Recommendations and improvements were to be suggested on the existing car park

4. Results and Analysis

The following displays the data from the interviews which reflect the thinking and behaviour parking users from Albany Bus Station and wharves in Devonport and Birkenhead. 100 interviews were commenced for the Albany Bus Station while 50 interviews each for Devonport and Birkenhead wharves. These interviewers came from random selection.

4.1. Knowledge of T2 parking

In Figure 1, the blue bar shows the percentage of the

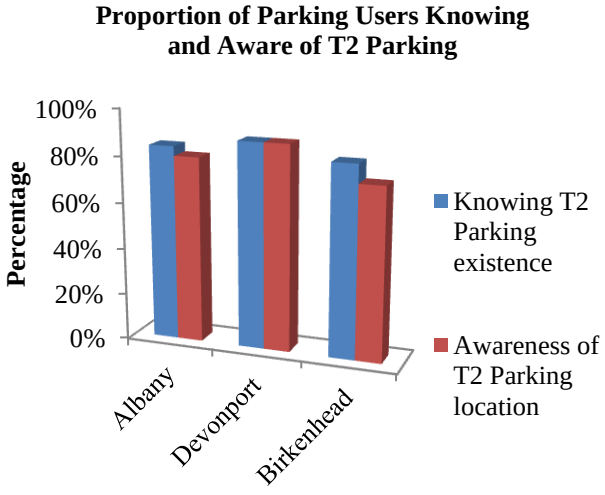

Figure 2: People knowing and aware of T2 parking

parking users that know the meaning of T2 parking whereas the red bar shows the percentage of people from the blue bar that are aware of the T2 parking location in the respective car park. In Albany, 84% of the parking users know the meaning of T2 parking whereas 88% for Devonport and 82% for Birkenhead. Overall, more than 80% of the parking users are familiar with the T2 parking provision with minority being unfamiliar with it.

4.2. T2 parking consideration

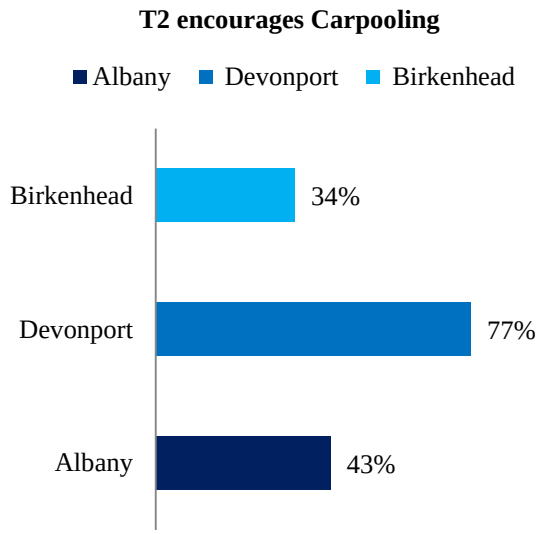

Figure 3: Encouragement of T2 parking

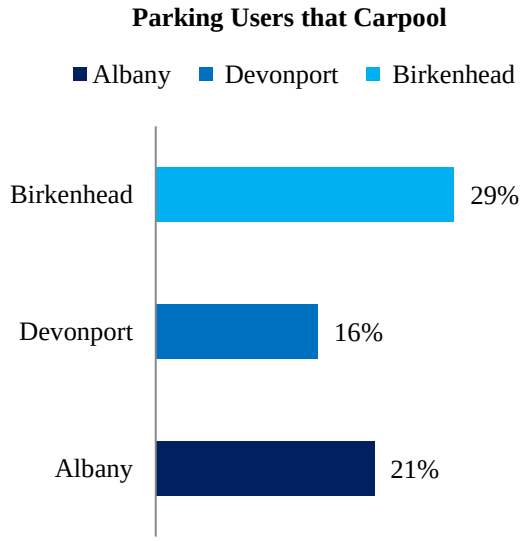

Figure 4: Proportion of people that carpool

Figure 2 shows the percentage of parking users that are encouraged to carpool by the T2 parking provision. The parking site in Devonport has the highest encouragement, which is 77% of the parking users are motivated to carpool, followed by Albany, 43% and finally Birkenhead, 34%.

Figure 3 shows the percentage of parking users that are actually carpooling. With highest percentage of carpoolers in Birkenhead, 29%, Albany comes second with 21% and finally Devonport with 16%.

4.3. Carpooling factors

There are five main factors that contribute to carpooling:

- Time – required time for a complete to and fro journey
- Convenience – accessibility of a journey without any major time constraint
- Location – location of the pickup (carpool partner) results change in ordinary travelled path
- People factor – availability of a carpool partner
- Cost – savings in terms of travelled cost

4.3.1. Reasons to carpool

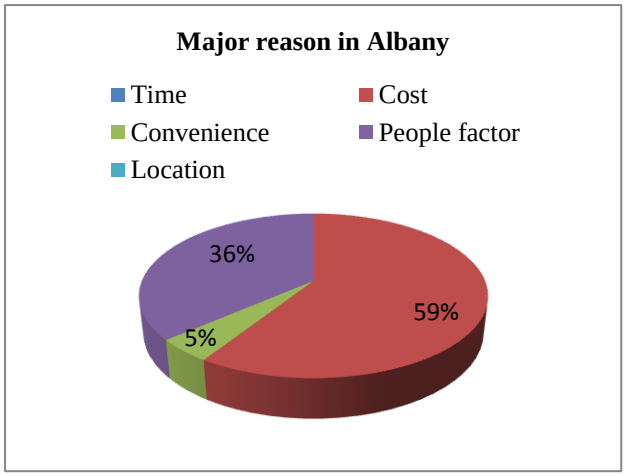

Figure 5: Major carpooling reason in Albany

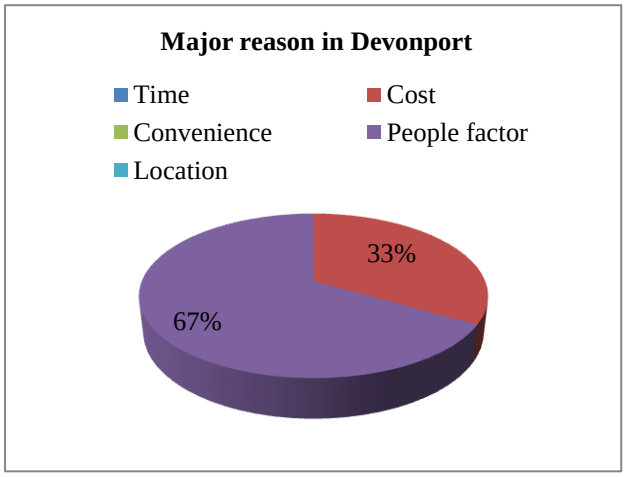

Figure5: Major carpooling reason in Devonport

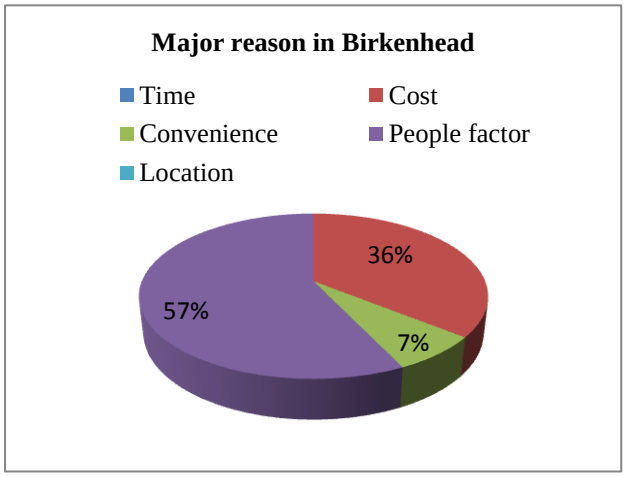

Figure 6: Major carpooling reasons in Birkenhead

4.3.2. Reasons not to carpool

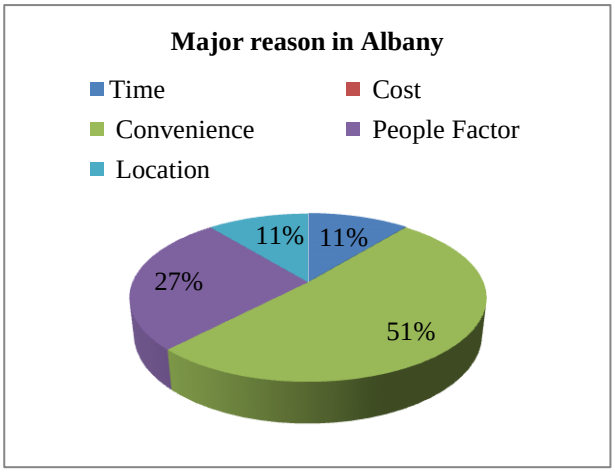

Figure 7: Major non-carpooling reason in Albany

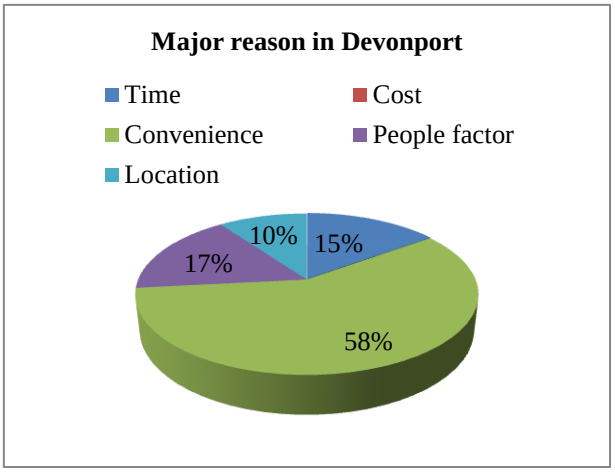

Figure 8: Major non-carpooling reason in Devonport

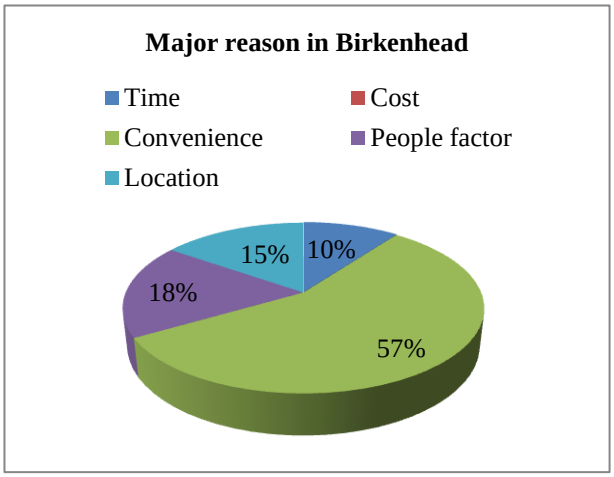

Figure 9: Major non-carpooling reason in Birkenhead

In Albany, the cost factor takes up the main factor which is shown as the blue section in the pie chart whereas people factor becomes the major in both Devonport and Birkenhead.

The inconvenience factor is the main reasons for people being unable to carpool in all the three parking sites, followed by unable to find a carpool partner which is the people factor.

4.4. Carpooling frequency and effect on daily schedule

Table 1:Carpooling frequency and effect

Parking Site	Albany	Devonport	Birkenhead
Carpool for five days in a week	83%	86%	75%
Delay due to carpool is less than 15 minutes	78%	86%	83%

The table shows how often people share rides on weekday's basis and their daily schedule adjustment in order to carpool.

83% of the car poolers in Albany share ride for five days in a week whereas 86% in Devonport and 75% in Birkenhead. On average more than 81% of them perform carpooling from Mondays to Fridays.

The majority of the parking users only consider carpooling if the impact of delay to their daily schedule is no more than 15 minutes. In Albany, 78% of the car poolers have delay less than 15 minutes while 86% and 83% in Devonport and Birkenhead respective.

4.5. Suitable Parking

Table 2: Frequency of getting suitable parking spot

Parking Site	Frequently get good parking spot
Albany (after extension)	42% (91%)
Devonport	81%
Birkenhead	90%

The results in table 2 only display the feedback from non-carpooling users as it is based on analysing the ease of parking users find a non T2 parking spot. There was a significant change in percentage in the Albany after the car park extension, i.e. from 42% to 91%.

4.6. Non car poolers willing to share ride given opportunity

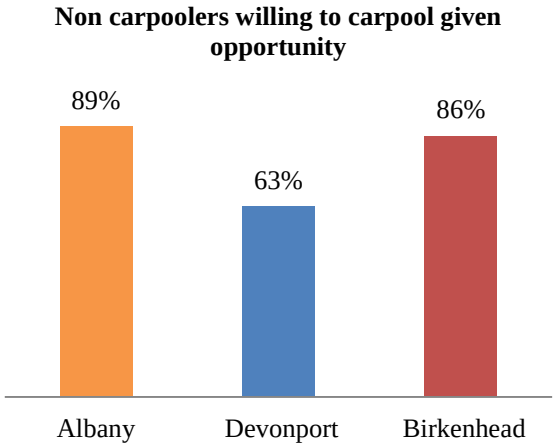

Figure 6: Non carpool users to car poolers

The chart displays the percentage of non-carpooling parking users who are willing to share ride given any of these opportunities:

- No time constraint
- Very convenient
- Carpool partner within close distance
- Someone is willing to share ride
- Substantial savings in travelling costs

In general, at least 63% of the non-carpooling users are willing to consider sharing ride if their problems are ideally solved.

4.7. Albany Car Park (after extension)

Table 3: Recommendations on Albany car park after extension

Increase T2 parking	68%
Mobility parking to T2 parking	38%

The above recommendations were suggested to the Albany car park after the extension. Majority of the parking users agree to have an extension of the T2 spaces. Though the mobility parking never get full utilized, based on the feedback from the interviewers, the mobility parking should be left untouched.

5. Discussion

5.1. Knowledge on T2 parking

Overall, the majority of the parking users in all the three parking sites are familiar and the awareness of its location in the respective car park is very high. However, there are still a small proportion of people who do not know the meaning the T2 parking. This may due to the fact the implementation of T2 parking provision only happened in 2010 which was two year ago. In addition, parking users were more familiar with the term 'carpool parking' instead of 'T2 parking'. It is believed that as time proceeds, T2 parking will gain higher popularity in the future.

5.2. Encouragement on Carpooling and Carpooling Percentage

In Figure 2 and Figure 3, there is a difference between the percentage of T2 parking encouraging people to carpool and the people who are really carpooling. This means some of the parking users realise the benefits of T2 parking but some factors are restricting them from doing so.

These data were based loosely on random parking users and people thinking. The proportion of people that carpool should not be used for further studies as it is just a comparison between encouragement of T2 on carpooling and percentage of people that carpool. The actual proportion of carpooling users should be based on Traffic Survey Count.

In the Traffic Survey Counts, the percentage of HOVs is 9%, 22%, and 32% in Albany, Devonport, and Birkenhead respectively (Chu, 2012).

5.3. Carpooling Factors and Impact

In order to increase carpooling, it is crucial to learn the factors that are driving people to do so. The five major factors are time, convenience, location, people factor and cost.

As residential area is distant from the Albany Bus Station, travelling to the station cab be quite costly and therefore the cost becomes the major factor for people to carpool. Unlike in Devonport and Birkenhead wharves people factor takes the highest percentage because both wharves only target their nearby respective residential area.

The reasons behind the non-carpooling users are important as well. It is known that sharing ride can be very inconvenient as the ride sharing parties will have to adjust their daily schedule accordingly to their respective carpool partner. As a support to this statement, most people would only consider carpooling if the delay is less than 15 minutes.

5.4. Carpool frequency

In table 1, at least 75% of the car poolers do carpool for five days in a week which means that these people have permanent work and daily activities. While they are relying on the public transport, they cannot afford any major delay to their schedule which will results in missing the public transport and disruption to the work and activities.

5.5. Frequency of getting suitable parking

From Table 2, it is shown that the chance of people getting a good parking spot had been doubled after the extension of the car park in Albany which results in the capacity of the car park has exceeded the demand of the parking users **(**Chu, 2012**).**

In comparison between the car parks of Devonport and Birkenhead, Devonport parking site is located in the form of cluster whereas Birkenhead car park is located along the street with side angle parking. Therefore, people will often find it more difficult to determine the remaining vacancy of the parking in Devonport compared to Birkenhead, i.e. 81% and 90% in Devonport and Birkenhead respectively.

5.6. Non carpooling users to carpooling users

From Traffic Survey Counts, the percentage of HOVs is 91%, 78%, and 68% in Albany, Devonport, and Birkenhead respectively (Chu, 2012). In Figure 6, the non-carpooling users who are willing to consider carpooling are 89%, 63% and 86% in Albany, Devonport and Birkenhead respectively. This results in 81%, 49%, and 59% of improvements in the three car parks restively. In overall, there will be a possibility that the carpooling activities will increase by at least half its original value.

5.7. Recommendations to Albany car park after extension

Majority of the interviews agreed that the T2 spaces should be expanded as prior to the extension of the whole car park, the non T2 parking were limited but after the extension the capacity far exceeded the demand. In addition the time when the T2 parking is full is rather early, between 8:00am and 8:30am, an indication that there is extra demand for T2 parking (Chu, 2012).

As the mobility parking never been fully utilised, a suggestion was made which was to convert some of the mobility parking to T2 parking. Only minority of the interviewers provided positive feedback while the majority thought that they should be reserved as a privilege for someone who needs it.

6. Recommendations and Improvements

- Expansion of T2 parking
- Provide indication of the remaining parking vacancy
- Develop a strategy to help non-carpooling users who are willing to carpool
- Consider re-arrangement of car park to provide better and more convenient parking
- Continue monitoring the changes and demands of the existing car parks.

7. Conclusion

In general majority of the parking users have knowledge on the T2 parking indicating that T2 parking has high popularity. This research has proven that the T2 parking provisions are effective for carpooling and can promote the use of public transport in Auckland. Potential for improvement is available for further considerable extension of T2 parking utilisation.

Acknowledgements

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