# Ecological Footprint of Japanese Tourists in New Zealand

*A thesis presented in partial fulfilment for the degree of*
*Master of Science in Conservation Biology*
*at Massey University, Palmerston North, New Zealand*

Yoko Shimada

2006

# I. ABSTRACT

Ecological Footprint Analysis (EFA) was employed to assess the ecological sustainability of Japanese tourists in New Zealand. To gather information, survey questionnaires were delivered to the Japanese travellers at Auckland International Airport. Furthermore, an extensive literature review, a pilot study, and participation in a full-day tour were undertaken for more information.

The average daily EF of Japanese travellers in New Zealand was ten times larger than global biocapacity and slightly larger than the bioproductivity of New Zealand. The average daily EF of Japanese travellers was larger than the EF of Japanese residents, which indicated their lifestyle and behaviour was different during their travel and that they consume more resources (in particular for transport, housing and activities). Japanese travellers had larger EFs in every consumption category but transport, housing and services components made their footprints considerably larger than that of New Zealand residents. The transportation sector is the main concern for sustainability as it was the largest source of the EF and 50 times larger than average transport footprint of a New Zealand resident. Energy land, cropland and built-up land were also larger than New Zealand residents' EF.

The size of the overall EF did not indicate clear differentiations among the segments, but different segments seemed to have different impacts. In general, school excursion and educational travellers appeared to be the most ecologically sustainable. The size of EF was also likely to correlate with the age of travellers and the length of stay. Younger Japanese travellers tended to have smaller EF than elderly travellers, especially for transport and overall energy consumption. The length of stay and the size of EF also appeared to have some correlations as the size of EFs had a tendency to become smaller with longer stays.

Japanese travellers are different from many other travellers. They tend to have larger housing footprints as the most popular accommodation types were hotels and farm/home-stay, which were the most energy intensive accommodation types. Japanese travellers were more efficient than others in some points, as many Japanese travellers prefer travelling as a group and use coaches. However, generally Japanese tended to be the very energy intensive travellers.

This study illustrated the lack of ecological sustainability of Japanese

travellers in New Zealand and suggested they could reconsider their travel behaviour to become more ecologically sustainable. Some management practices were suggested to reduce the size of EF with the future predictions about Japanese outbound tourism.

# II. ACKNOWLEDGEMENTS

First of all, I thank my supervisors Associate Professor John Holland and Dr. Mike Joy for their support during my thesis research. Particularly John's creativity helped me to plan and design the survey instrument. Mike helped me a lot for organising survey at Auckland airport, analysing the results, and editing/ proofreading the draft. I appreciate help from Denise Stewart, a secretary at INR at Massey University, for dealing with the financial part of my research and for arranging the international free postage envelops when she was extremely busy.

I would like to show my appreciation to David Adamson from the Auckland Airport company for letting me conduct the survey at the airport and also arranging the contacts with Air New Zealand and Japan Air line. I appreciate all the support from Debbie McKeown (Air New Zealand), Tania Nienhuis (Japan Airlines), the ground crews from both airlines, in particular Naomi Suzuki (Air New Zealand) and Shoko Cooper (JAL), for being very kind and supportive while I was at the airport. Also I would like to thank all the Japanese travellers who completed the survey, and tour operators/guides who let me approach their tour members.

During the trip with 14 Japanese tourists I was very fortunate to have two very helpful and friendly bus drivers, Peter Murphy from Ritchies Coach Lines in Christchurch and Terry Hohepa from Tranzit. They provided me very good advice.

I also thank my parents (especially my mom) for all their supports and helping organising a trip with their friends (a group of 14 Japanese) as well as the financial support. At last but not least, I want to express gratitude to my partner, Tom, for all his support and patience during the study including the technical suggestions in designing questionnaire.

# III. TABLE OF CONTENTS

# IV. LIST OF FIGURES

# V. LIST OF TABLES

# CHAPTER ONE:

# *INTRODUCTION*

## *1.1 Tourism Industry and Ecological Sustainability*

Tourism is one of the largest and fastest growing industries in the world. In many countries (including New Zealand), the tourism industry has been replaced as the solution of other industries that result in severe environmental degradation (e.g., exploitation of natural resources). In New Zealand, growth of the tourism industry was quite spectacular in the 1980s and the tourism industry moved from seventh place in 1980 to the top foreign exchange earner in 1988 (Lawson, 1991). The number of international visitors has grown to over two million recently and the tourism industry contributed to almost 10 % of New Zealand's GDP (Tourism Research Council New Zealand & The Ministry of Tourism, 2004). The tourism industry can provide a range of positive aspects into the regional and community development while tourism can also have various negative impacts. Since tourism becomes one of the major industries, environmental issues have started to arise. Many studies have been conducted to identify the impacts of tourism, and both positive and negative impacts of tourism have been identified or suggested.

Cessford and Dingwall (1999) classified the impacts of visitors on the environment into three types, i.e., physical damage, wildlife disturbance and biological invasions. Physical damage can be caused by foot or vehicle damage to surfaces (e.g., soil erosion, rock damage), negative behaviour of the tourists (e.g., fires, wood cutting), and visitor-related management actions (e.g., track/hut building). Biological invasions can be caused by accidental imports of seeds/pests or by spreading weeds. Blaschke *et al.* (1997) divided the effects of tourism on the natural environment into two main categories, i.e., physical and ecological effects. Ecological effects include wildlife disruption, loss of habitats, hunting/collecting, vegetation damage, loss of wilderness, resource pressure, spread of effects, and risk of species introduction. Physical effects include air and water pollution, damage to soil structure and soil erosion, and damage to geological structure.

Patterson & McDonald (2004) assessed the direct and indirect environmental effects of tourism sector in New Zealand, by constructing input-output economic-environmental accounts of the tourism sector. They found that the general performance of the tourism sector was poor. The tourism sector ranked from the fourth to the 12$^{th}$ largest impacts out of 25 sectors for eight indicator variables. One of the main environmental issues of the New Zealand tourism industry is a high level of resource consumption. Energy usage and greenhouse gas emissions are particular concerns (Becken, 2004). In New Zealand, the tourism industry contributed six percent of national energy use in 1997/98 (Becken & Cavanagh, 2003) and is directly responsible for the production of 1.4 million tones of carbon dioxide ($CO_2$) (Becken, 2003b). Direct $CO_2$ emissions from tourism sector account 17.8 % of that produced by the entire NZ economy (Patterson & McDonald, 2004). In order to offset the amount of $CO_2$ generated by tourists, New Zealand requires a huge area of forest. Further, the tourism industry requires a large area of land, directly occupying 65,564 ha or 873,525 ha including indirect uses (Patterson & McDonald, 2004). A large amount of water is also consumed by tourists (373 L/visitor/day) (Patterson & McDonald, 2004).

These high levels of resource consumption and emissions can cause damage for the New Zealand tourism industry. Global warming caused by greenhouse gas emissions may impact on tourism by changing the New Zealand unique landscape (e.g., glacier retrieve in the West Coast) (Becken, 2004). In addition, unsustainable resource consumption rate may lead to exploitation of natural resources and environmental degradation. The wildlife of New Zealand may also be affected. The New Zealand's clean and green image and extremely distinctive flora and fauna are crucial to its tourism industry to attract international tourists. Also the New Zealand Tourism Board (NZTB) marketing campaign '100% Pure New Zealand' emphasizes New Zealand's natural beauty (Jolliffe, 2004). If New Zealand's 'clean and green' image was damaged, it could damage the tourism industry. Jolliffe (2004) also pointed out that the loss of these unique features would disadvantage the New Zealand tourism industry.

In order for the New Zealand tourism industry to remain or develop further, the industry needs to be carefully managed in sustainable manners. 'Sustainable development' means "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (World

Commission on Environment and Development, 1987). The concept of sustainability includes a broad aspect from environmental to socio-cultural and economical perspectives; however, the ecological component is particularly essential. To be sustainable, the ecological sustainability of tourism needs to be assessed and the issues associated with tourism also need to be recognized. For the better management, the causes of the issues need to be identified. Acknowledgment of the tourists' behaviour that results in environmental damage (including high level of resource consumption) may be valuable for the management to solve some issues.

Some behaviour of tourists can sometimes be anticipated by several factors. The nationality of tourists can have a modifying influence on the specific behaviour and profiles (Becken & Gnoth, 2004). The countries of origin may have an important effect on the energy consumption since there is clear association between nationality and preferred travel style (Becken & Gnoth, 2004). Differences in tourist types among nationalities may be explained by socio-political differences, geographical distances, cultural values, length of statutory holidays and communication strategies (Becken & Gnoth, 2004). Becken and Gnoth studied the tourist consumption patterns among the American, German, and Australian visitors to New Zealand. They then suggested that nationality analysis to other markets, for example, from the Asian region would be interesting. Japan would be a particular interest as it is one of the key markets (Becken & Gnoth, 2004).

Japan is one of the largest sources for outbound tourism worldwide (Becken, 2003a) and the Japanese tourists are considered to be one of the most profitable markets in many countries, especially Europe, the United States, Asia, Canada, and Australia (New Zealand Tourism Board, 1993, 1996a). Japan is ranked fourth in international tourism expenditure in the world after the Americans, the Germans, and the British in 2001 (Mak, Carlile, & Dai, 2004), spending US$32.8 billion in 1999 (World Tourism Organization, 2003). Additionally, Japanese travellers accounted for between 50 and 55 % of the US retailer DFS' US$1.5 billion sales in 2000 (Freathy, 2004). Japan is also New Zealand's fourth largest market behind Australia, the United Kingdom and the United States, and Japanese travellers are one of the highest spenders in New Zealand. Japanese tourists tend to spend a large amount of money on overseas travel, thus they expect even better amenities than they enjoy in their daily life back home (Department of Sport Recreation and Tourism, 1986). New Zealand Tourism Board (1993) commented that Japanese travellers are one of the

most challenging as their demand for quality service, facilities and products is the highest in the world. These suggest that Japanese travelers are likely to be consuming a large amount of resources while they are traveling, i.e., there might be issues associated with ecological sustainability of the New Zealand tourism industry.

Travel style and purpose of visit also influence the behaviour of tourists. When the energy requirements of tourists with different travel styles were compared, it varied among the tourists with different travel styles. The travel behaviour of six tourist types: coach tourists, visiting friends and relatives (VFR), auto tourists, backpackers, campers, and comfort travellers were examined by Becken (2003b) and Becken *et al.* (2003b). They found that coach tourists were the most energy-intensive tourist type; while backpackers and VFR tourists were energy efficient as they consumed the least energy per day. They also assessed sustainability for these six tourist types in terms of energy use, expenditure, regional dispersion, and flexibility/ openness and showed that the auto tourist, the camper and the backpackers are more sustainable than the coach tourist, the comfort travellers and VFRs.

Becken (2003b) summarised the characteristics of each traveller. Coach tourists tend to travel to the primary tourism centre (e.g., Auckland, Christchurch, Rotorua and Queenstown), and their main expenditure takes place in these main tourism destinations in relatively large businesses. They also show characteristics such as:

- demand comfort, service, quality of accommodation and a good 'atmosphere';
- high security need and risk avoidance;
- need for social relationships and a high sense of belonging;
- being well respected is important;
- outdoor activities and physical exercise is less important;
- prefer air travel;
- prefer visiting natural and cultural heritage attractions;
- not interested in exploring on foot or bike;
- want to see lots within a short time;
- the longest distance travelled per day (210 km);
- shortest length of stay (18 days);
- shortest nights per location (1.2 night);
- highest energy consumption per day (average of 409 MJ); and
- highest expenditure per day (average NZ$241).

However, the coach tourists differ considerably according to their country of origin. Becken (2003b) noted that coach tourists from the Australian, European, North American and Asian markets differ substantially in their travel behaviour and energy use. North Americana and Asian coach tours stay for a shorter time (nine and six days respectively), travel longer distances per day and also travel long distance by domestic air; thus their transport energy consumption per day is twice that of Australian and European coach tourists. On average, Australian coach tourists travel 2,540 km (or 243 km/day), visiting eight locations in 10 days. Also Asian coach tourists are more icon-driven than non-Asian coach tourists.

VFR travellers generally travel short distances per day and stay longer at each place. In addition, they:

- enjoy rest and relaxation and entertainment;
- landscape and service are less important;
- stay long and often repeat visitors;
- prefer travel slowly; and
- lowest expenditure per day (average NZ$83).

Backpackers often stay longer at each place (three nights) and they are regionally dispersed (20 different overnight locations). Their characteristics are:

- expect less service and infrastructure;
- join in outdoor activities and physical exercise;
- need for self-fulfilment, fun and excitement; and
- social relationships are important.

Hyde (2004) suggested that demographics are important characteristics to consider for marketing. He noted the important demographics are age, gender, nationality, income, and family lifecycle. For example, younger Japanese are more likely to undertake outdoor activities or being thrill seekers, while older females might enjoy general sightseeing and shopping. The senior people (55 years and older) were more actively engaged in culture and heritage, nature based sight seeing, beach/water activity, city based sightseeing/shopping, coastal area sightseeing, and themed activities such as visiting theme parks (New Zealand Tourism Board, 1996a; You & O'Leary, 2000). As people age, a sense of security and convenience becomes more important and they

tend to make travel arrangements before departure more than before. Activities that are risky or require more physical energy are not popular among the senior Japanese travellers (You & O'Leary, 2000). Also they prefer to stay in one place and explore more and do more things at one place rather than travelling to different places.

Gender is only occasionally important for grouping international tourists, while it is still important among Japanese travellers since there is still an identifiable 'office ladies' segment (Milner, Collins, Tachibana, & Hiser, 2000). 'Office Ladies' (or OLs) are single women, aged approximately 20 to 39 years old, in regular employment without strong company ties. The stereotypical portrayals emphasize their high disposable income and in a position to obtain sufficient leave from their companies, although it may not match the reality of their experiences. Their main aims of the overseas trips are often shopping and sight-seeing. They tend to join cheap package tours with reduced services that give greater flexibilities. These young female Japanese tourists have strong spending power (Hashimoto, 2000).

Gnoth (2003) and Gnoth and Watkins (2002) divided the Japanese tourists in New Zealand into '*Modernists*' and '*Conservatives*'. The *Modernists* are usually younger and more Western-oriented Japanese and have modern and individualistic values. The *Conservatives* are older segment of Japanese tourists and have strong orientation towards traditional Japanese culture and values in their general outlook, perceptions, preferences and everyday behaviour. The *Conservatives* require high level of familiarity and comfort from New Zealand guest facilities. They are moderately interested in New Zealand's culture (lifestyle, people or history), and they possess the value for preserving harmony and avoid extreme actions.

## *1.2 Ecological Footprint*

Many approaches to assess sustainability have been suggested in recent years. Ecological Footprint Analysis (EFA) was introduced by Mathis Wackernagel and William Rees at the University of British Colombia around 1990 (Chambers, Simmons, & Wackernagel, 2000). Ecological Footprint (EF) is one of the methods to determine the ecological sustainability, by quantifying the resource requirements of human activity. The concept of EFA is closely related to ecological carrying capacity. The carrying capacity is the ability of the destination to absorb visitors and refers to a threshold level of tourist activity beyond which damage can occur (Mason, 1990). EF is defined as "the total area of productive land and water required continuously to produce all the resources consumed and to assimilate all the wastes produced, by a defined population, wherever on Earth that land is located." (Rees & Wackernagel, 1996, p229). The EF can indicate the pressure of human society to the environment and can simplify and translate the impacts into one common term, i.e., hectare per capita, which also helps visualising the impacts and can easily be compared with a different group of populations or activities and their sustainability.

EF can estimates the extent to which we have to reduce our consumption, improve our technology, or change our behaviour to achieve sustainability (Rees & Wackernagel, 1996). EF can also be used in a time-series study and can help monitoring progress to reduce the sustainability gap with new technological improvements or consumer behavioural changes. Further, EFA can be employed to assess the impacts of any activities or specific locations, then their EFs can be compared to indicate the impacts of different human activities or any given populations (van den Bergh & Verbruggen, 1999).

The impacts of tourism on the environment may depend on the ecological carrying capacities of the destinations. Hence the EFA can be a useful tool to assess the ecological sustainability of tourism. Use of EF as an indicator of the ecological sustainability of tourism has been suggested by several researchers, (e.g., Hunter (2002) introduced a concept of 'touristic ecological footprint' and Gossling *et al.* (2002) used EFA to examine the sustainability of tourism in tropical island of Seychelles). EF can include the entire resource consumption by tourists, which is normally difficult to be integrated by other indicators. Since the high levels of energy

and other resource consumptions are the particular concerns for the New Zealand tourism industry, EFA could be the best available approach to assess the ecological sustainability of the tourism industry. Also the EF can be compared; therefore, the most ecologically sustainable type of tourists may be identified by comparing the size of EF. This may help identifying what type of resource consumption might be a problem and how and the extent to which behaviour of tourists could be altered to achieve sustainability.

## *1.3 Aim and Objectives*

The aim of the study is to evaluate ecological sustainability of the New Zealand tourism industry using Ecological Footprint Analysis (EFA) particularly focusing on Japanese tourists. In order for the aim, the objectives are identified:

1. Quantify resource requirement and calculate the EF of Japanese tourists in New Zealand;
2. Calculate the ecological deficit as a measure of ecological unsustainability;
3. Find out if tourists are consuming resources more than resident, and if any, examine the extent and what causes the such resource consumption pattern;
4. Examine the dynamics of Japanese tourists (e.g., demographics, purpose of visit and travel styles) as these factors may influence the behaviour of tourists;
5. Identify the causes of the behaviour (therefore resource consumption pattern) that results in high level of resource consumption (i.e., large EF); and
6. Suggest recommendations for more sustainable tourism industry operations.

This study will provide a benchmark to the resource consumption of Japanese tourists in New Zealand and, hopefully, provide insights to future tourism in New Zealand. In addition, there has been little previous research on the resource requirements of Japanese tourists. Thus, this study would provide the insight of the Japanese travellers' resource requirement in many different countries.

In addition, there is a tendency of Japanese tourists to be used as benchmark for dealing with other Asian visitors since East Asia is the fastest growing outbound region in the world (March, 1997). This means that this study may also give an insight of resource consumption by other Asian visitors.

# CHAPTER TWO:

# *LITERATURE REVIEW*

## *2.1 Introduction*

This chapter summarises significant previous studies in following areas:

- Concept and limitations of ecological footprint analysis (EFA);
- Ecological footprints (EFs) of the world (particularly for New Zealand and Japan);
- Use of EFA in tourism;
- The New Zealand tourism industry and its impacts;
- Energy use in the tourism industry; and
- Japanese outbound tourism

The first section introduces the concept of EFA and evaluates the pros and cons of EFA as this research method is relatively newly developed and there are some controversial views about EFA. The second section shows the prior research of EFA. The EFs of New Zealand and Japan were closely examined to see the consumption patterns of these populations from EFA of Loh and Wackernagel (2004). The examples of EFA employed to assess the sustainability of tourism was also introduced. The reviews of studies about the New Zealand tourism industry help to recognise the recent issues related to tourism in New Zealand. The intensive energy use in the tourism industry is one of the major concerns. Thus the summary of prior studies about the energy consumption in tourism can be valuable. In addition, some of the figures from other studies were applied in my EF calculation. The background information on Japanese outbound tourism is helpful to understand their behavioural characteristics and consumption patterns since the Japanese tourists can be considered as unique in western society due to their unique culture, lifestyle and historical background.

## 2.2 Ecological Footprint Analysis

### 2.2.1 Concept of EFA

The EFA was derived from the concept of carrying capacity, which is an important aspect to consider the sustainability of tourism. The carrying capacity can be subdivided into two types – environmental and ecological. The environmental carrying capacity is the maximum level of tourism use in a destination before the tourists notice a decrease in the attractiveness of the area. The concept of EF is related to ecological carrying capacity which is defined as the maximum population of a given species that can be supported in a defined area without permanently damaging the productivity of that habitat (Bicknell, Ball, Cullen, & Bigsby, 1998). Cohen (1995) studied human carrying capacity of the Earth, which could range from less than 1 billion to over 1000 billion since different researchers performed different calculations. However, he noted that the number of people the Earth can support depended on what people want from life. In addition, humans may be able to increase the population size beyond the carrying capacity by eliminating other species, importing resources from other places, and through technological improvement. Although human society seems to be developing away from nature, we still rely on nature to support our lives and cannot survive without the services provided by ecosystems (production, assimilation, purification, etc). From a trophic-dynamic point of view, humans are no different from other consumer species (Rees & Wackernagel, 1996).

The question is no longer simply about the number of humans the Earth can support; but rather the extent of human resource consumption. The lifestyle of human society has changed dramatically, particularly in developed countries in the last century. People are consuming more and more resources and energy requirements have dramatically increased. In fact, it is estimated that only 20 % of the world population (approx. 1.2 billion people) in the developed countries are consuming about 67 % of all the resources and generating 75 % of all waste and pollution including greenhouse gases (Speidel, 2002). The human environmental impacts (I) is often expressed as a product of population (P), affluence (A), and technology (T); that is: I = P*A*T (Ehrlich & Holdren, 1972). This formula was later modified by Kates

(2000) as I = P*C/P*I/C (the Population/Consumption version), where I = environmental degradation and /or resource depletion; P = the number of people or households; and C = the transformation of energy, materials, and information.

EFA can eliminate these ambiguities of carrying capacity. EF indicates the demands of population on natural capital in a land-based surrogate measure. The basic idea of EFA is based on the fact that every individual, process, activity, and region has an impact on the Earth via resource use, waste generation, and the use of ecosystem services provided by nature (van den Bergh & Verbruggen, 1999). Then EFA can translate all these impacts into biologically productive land. The EF estimates the size of productive land required to produce the resources (e.g., food, goods, services, and energy) and land occupied by infrastructures (e.g., road and buildings) as well as the land to assimilate waste and greenhouse gas ($CO_2$) emissions produced by entire activities including during the processing/transporting the products.

The EF estimates the area of productive land required for the activity and resource in different productive land types. This is because different activities and resources consumed require different type of land which has different qualities and productivities. The productive areas were simplified into six areas (energy land, arable land, pasture, forest, build-up land, and aquatic area). Energy land indicates the area forest required to sequester carbon dioxide ($CO_2$) emission from fossil energy consumption. Cropland (or arable land) is agricultural land mainly for food production (e.g., grains and vegetables) but some area is also required for goods (e.g., clothes) and for feed crops for farm animals. The cropland is, biologically speaking, the most productive land. Pasture is for growing grasses for livestock mainly for food production (meal and dairy) but also some area for goods (e.g., wool and leather). Typically, pasture is less productive than cropland. Built-up land is where bio-productive capacity has been largely lost to development (e.g., housing, building, roads, landfill, and other infrastructures). The examples of human settlements invariably demonstrate that the most productive cropland is used for development (Chambers *et al.*, 2000). Forest is area required for timber (for building, furniture and other wooden products), paper products and firewood, and is also required for water. In reality, ecosystems have more diverse functions and their productivities vary from place to place due to the climate, geology, and other factors within a country. Yet, it was assumed that the land has the same productivity (average numbers were normally applied regardless of the specific locations).

EFs can be applied in several ways. EF can indicate the gaps between their resource requirements and the carrying capacity (or bioproductivity) of the region, country or even an entire planet. The gaps of current resource requirements and the actual capacity are referred to as an 'ecological deficit' that can indicate unsustainability. An ecological deficit can indicate that a country (or any population) is depleting its natural capital, and that its economy is unsustainable (Andersson & Lindroth, 2001). For example, the productive area of the biosphere was allocated to 1.8 global hectares per person in 2001, while the actual global demand (i.e., EF) was 2.2 global hectares per person (Loh & Wackernagel, 2004). This meant that the current EF has already exceeded the biological carrying capacity of the Earth by 22 %.

The EF was normally expressed in global hectare (gha) or global $m^2$ ($gm^2$). Global hectare means a hectare with global average biomass productivity and it allows the comparison of footprints across different countries, where the land might have different qualities and productivities.

### 2.2.2 Limitations of EFA

Since Wackernagel and Rees developed the concept of EFA in early 1990s, this method has been advocated by many scientists and ecological economists for use as a sustainability measure, however, there are divisive views. EFA has many advantages but also has several limitations and criticisms. The criticisms from van den Bergh & Verbruggen (1999) were particularly controversial. First, EF does not reflect the different types of land use and may oversimplify the impacts (van den Bergh & Verbruggen, 1999). One particular land practice may have more pressure to the environment than the others. For instance, land used for building infrastructure and for pasture has the same weight in EF even though built-up land would have much more severe impacts as the land would loose the productivity permanently (van den Bergh & Verbruggen, 1999). Even different types of agriculture can have different impacts on land depending on the management systems but EF cannot distinguish these differences. EF does not consider a trade-off between environmental sustainability and intensive land use. For agricultural land use, for instance, intensive farming would translate to a small contribution to the EF, while it usually has high

environmental pressure due to the use of pesticides, fertilisers, and irrigation (van den Bergh & Verbruggen, 1999). Some sites might be more sensitive than others and might have specific issues associated with the unique environment (e.g., breeding habitats of endangered wildlife, geothermal areas, alpine environment) (Barringer, Walcroft, Forer, & Hughey, c2002).

Second, EFA considers only one function for each land type although most land has more than one function and provides multiple services (van den Bergh & Verbruggen, 1999). To illustrate this, energy land is not only the productive land that absorbs $CO_2$; for example, pasture, productive forest land (for timber), other native forest (for biodiversity or allocated for wildlife), and ocean can also all absorb $CO_2$. Energy land alone might indicate the overall unsustainability but it could be sustainable because other types of land are not considered in EF for $CO_2$ absorption. In addition, there are other ways to absorb $CO_2$. For instance, $CO_2$ can be compressed and dumped into oil or gas fields to replace the fuel that has been extracted, and it can incidentally increase the pressure of the fuel that remains (Ayres, 2000). Also $CO_2$ could be liquefied and pumped into the deep ocean so it will dissolve under pressure (Ayres, 2000). However, these alternative options for absorbing $CO_2$ are not considered in EFA. Another criticism is that EFA does not consider the possibility of trading emission rights (Ayres, 2000). This means that the actual land area available for $CO_2$ absorption is larger than the one expressed in EFA as biocapacity.

van den Bergh and Verbruggen (1999) also pointed out the arbitrariness of the spatial boundary (national, regional or local scales) used in EFA. This was because the national boundaries are frequently of a geo-political and cultural nature and there are no environmental meanings for many countries especially on the continents. Wackernagel & Silverstein (2000) argued to this criticism as political borders affect management regimes, consequently ecosystems are shaped by the way people use them. Hence, it is useful to know the average EF of a given socially defined population (Wackernagel & Silverstein, 2000). Even though national boundaries can still be a concern in some cases, the national boundary has environmental meaning in New Zealand as is surrounded by the sea and is far from any other continents.

Moreover, EF cannot differentiate pollutants. EFA considers only $CO_2$ emissions and other pollutants, such as methane, sulphur and nitrogen, which have serious consequences, are neglected by the EF scheme (Ayres, 2000; van den Bergh &

Verbruggen, 1999). Pollutants responsible for global warming include carbon dioxide ($CO_2$), methane ($CH_4$), chlorofluorocarbons (CFC), and low-level ozone precursors such as hydrocarbons (HC) and nitrous oxides ($N_2O$) (European Conference of Ministers of Transport, 1997). Emissions of these gases occur during the production and processing of fossil fuels; in their combustion; and in the manufacture and disposal of equipments (ECMT 1997). The other pollutants were ignored since $CO_2$ is the dominant greenhouse gas, accounting for 75 % of global emission and 81 % emission from OECD countries (exclude $CO_2$ emission from land use and forestry uptake) (OECD, 2001).

EFA does not include some of greenhouse gas emissions. $CO_2$ and other greenhouse gases can also be generated from land clearing and enteric fermentation in livestock. In EFA, the impacts of the hydro dam for electric generation is only measured as a loss of productive land due to the water, but has impacts on water flow, effects on aquatic life, $CH_4$ release (OECD, 2001).

Finally, EF cannot integrate the bio-physical damage, wildlife disturbance or social/cultural impacts to local community. This means that it may require additional study to assess the sustainability or detailed impacts. EFA could be best performed with other indicators such as Environmental Impact Assessment or with Living Planet index employed by Loh and Wackernagel (2004).

Although the simplification of the impacts is criticized, it is also regarded as one of the strengths of EFA as the entire impacts can be shown in one simple measurement (namely the area of productive land) and it is straightforward to visualise the impacts. The clear, unambiguous and straightforward message is essential for policy makers and the general public (Moffatt, 2000; Templet, 2000). As a consequence of some of the limitations mentioned earlier, EFA generally gives conservative figures. Therefore, EF illustrates a minimum condition for ecological sustainability despite their limitations, and EF must be smaller than the biocapacity to be sustainable even the calculation could be underestimating the impacts (Wackernagel & Silverstein, 2000).

### 2.2.3 Ecological Footprints of the World

EFs vary among countries ranging from less than one ha to over 10 ha per capita (Wackernagel *et al.*, 2000) (Fig. 1). The rough calculations suggested that the EF of all industrialised nations is larger than the available ecologically productive land on Earth (Fig. 2), even these industrialised nations represent less than 20 % of the world population (Wackernagel & Rees, 1997). New Zealand has one of the largest per capita EFs in the world, indicating unsustainability in global terms. At the same time, New Zealand is one of the few developed countries that are living within country's own carrying capacity. Loh & Wackernagel (2004) published EFs of 147 countries in seven global regions using 2001 data. Their report included the components of each EF (EF by each land type and consumption category) and was possibly the latest EFs available to this date. They also assessed EFs according to high, middle and low income countries and the average EFs were noticeably larger in high income countries (6.4 global ha /person) than middle (1.9 global ha/person) and low income countries (0.8 global ha/person).

According to their report, the EFs of New Zealand and Japan are far larger than the world average EF or the global biocapacity (Table 1). New Zealand's EF was 5.5 global ha/capita in 2001 while the bioproductivity of New Zealand was 14.5 global ha/capita. This indicated that New Zealand is within its carrying capacity. In Japan, however, the EF was 4.3 global ha/capita and available biocapacity was 0.8 global ha/capita, which indicated ecological deficit of 3.6 global ha/capita (Loh & Wackernagel, 2004). This meant that Japan was relying heavily on the resources from outside countries or damaging the environment by exploiting resources unsustainably.

Energy land was the largest element of EFs in many developed countries. In Japan, 65 % of EF was energy land. However, New Zealand is an exception because energy land is only about a quarter of its total EF, and its per capita size is also noticeably smaller than many other developed nations (Table 1 & 2). This may be partially because the majority (65 %) of electricity is generated by renewable energy (mainly hydro-electricity) in New Zealand. This means that electricity generation does not produce much $CO_2$ and is not translated into EF. However, productive land (either pasture or arable land) would be permanently lost and also there are other potential ecological impacts by building the dams, which are frequently

underestimated in EFA. The main industries in New Zealand are agriculture, horticulture and forestry but not heavy industry. This may be the explanation of small energy land in New Zealand but larger EFs in other productive land. In contrast, energy land is the major portion of EF in Japan. Japan is responsible for approximately 4.7 % of the world's total fossil fuel based $CO_2$ emissions and ranked fourth in the world behind the US, China and Russia (Carbon Sequestration Leadership Forum, 2005). In addition, most electricity (68.5 %) is generated from fossil fuels in Japan (Carbon Sequestration Leadership Forum, 2005). However, Japan's per capita carbon emissions are less than half of that produced by the US, partly because of energy efficiency (Carbon Sequestration Leadership Forum, 2005).

**Fig. 1 Ecological Footprints of 31 nations and the global average in 2001 (Loh & Wackernagel, 2004).**

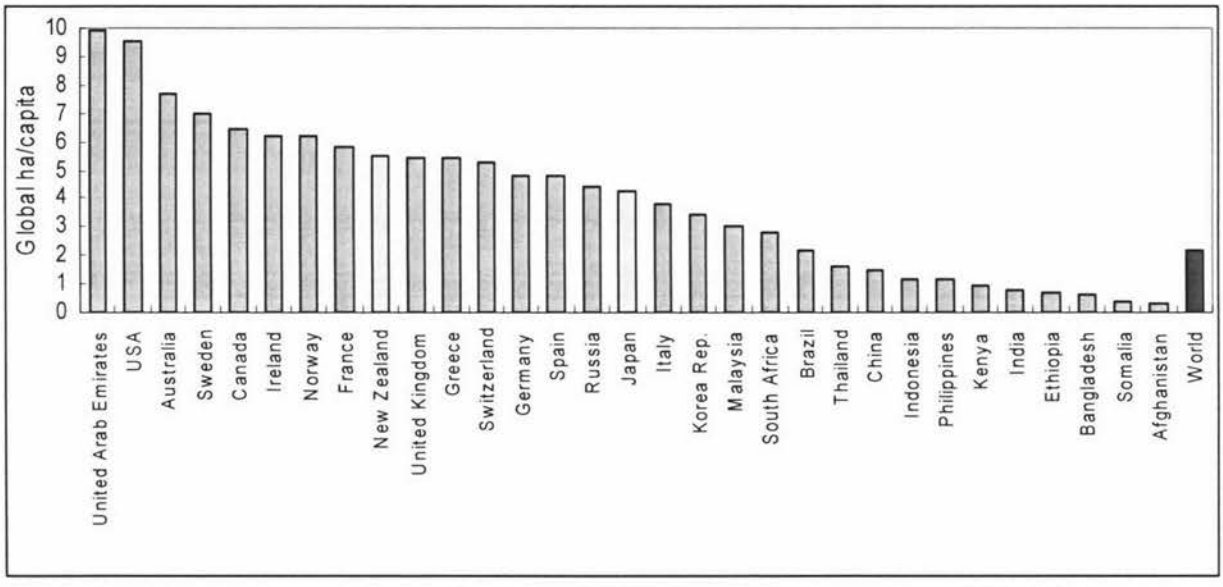


**Fig. 2 Ecological Footprints and existing biocapacities of selected nations in 2001 (Loh & Wackernagel, 2004).**

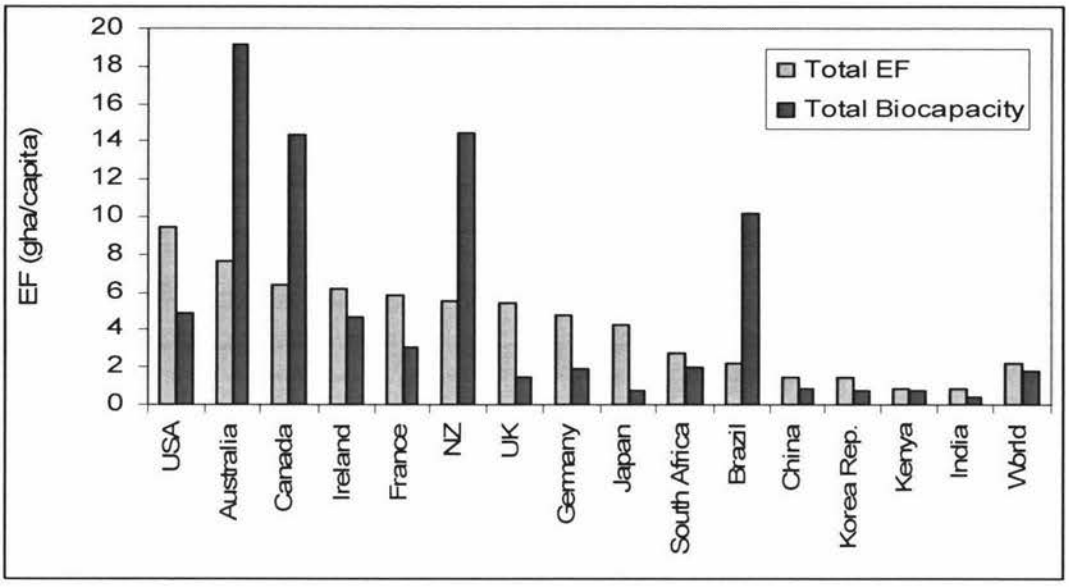



**Table 1 Annual EF of New Zealand, Japan, and the world average (global ha per capita per year) in 2001 (Loh & Wackernagel, 2004).**

| | Energy land | Cropland | Pasture | Forest | Built-up | Fishing | Total EF |
|---|---|---|---|---|---|---|---|
| New Zealand | 1.3 | 0.62 | 1.05 | 1.45 | 0.13 | 0.86 | 5.5 |
| Japan | 2.8 | 0.48 | 0.08 | 0.33 | 0.07 | 0.55 | 4.3 |
| World | 1.2 | 0.49 | 0.14 | 0.18 | 0.07 | 0.13 | 2.2 |

**Table 2 EF distributions of New Zealand, Japan, and the world average in 2001 (Loh & Wackernagel, 2004) .**

| | Energy land | Cropland | Pasture | Forest | Built-up | Fishing | Total EF |
|---|---|---|---|---|---|---|---|
| New Zealand | 24% | 11% | 19% | 26% | 2% | 16% | 100% |
| Japan | 65% | 11% | 2% | 8% | 2% | 13% | 100% |
| World | 55% | 22% | 6% | 8% | 3% | 6% | 100% |

### 2.2.4 EFA for Tourism Sustainability

Use of EF as an indicator of the sustainability of tourism has been suggested by several researchers. Hunter (2002) introduced a concept of 'touristic ecological footprint' (TEF) that can compare the real impact of tourism by providing a more holistic view of sustainability and environmental damage (Hunter, 2002). Other indicators of tourism sustainability often focus on local environment at destination and do not identify the holistic impacts involved in tourism. Hunter (2002) used one example of two tourists from London to illustrate his point; one take a week-long 'all-in' package holiday to Costa del Sol in Spain (a mass tourism destination which is more frequently associated with local environmental degradation but is closer destination from London) compared with a trekking holiday in Nepal (an alternative nature tourism but involves a long-haul flight). It would be difficult to compare which tourist might have larger environmental impacts than others; while TEF may be employed to determine the actual environmental demand in global point of view.

Some researchers have already implicated the EFA in assessing the sustainability of tourism development. For example, Gossling *et al.* (2002) used EFA to examine the sustainability of tourism in tropical island of Seychelles in global perspectives. They found that the EF of tourists (for 10.4 days) was 17 – 37 % of the annual EF of a citizen of an industrialised country and the energy footprint was a particular concern. They concluded that the large EF indicated that Seychelles are dependent on a large ecological hinterland to maintain their tourist industry, and the large transport energy footprint results in global warming and other ecological damages such as species extinction and coral breaching. They suggested discouraging air travel to reduce the size of EF.

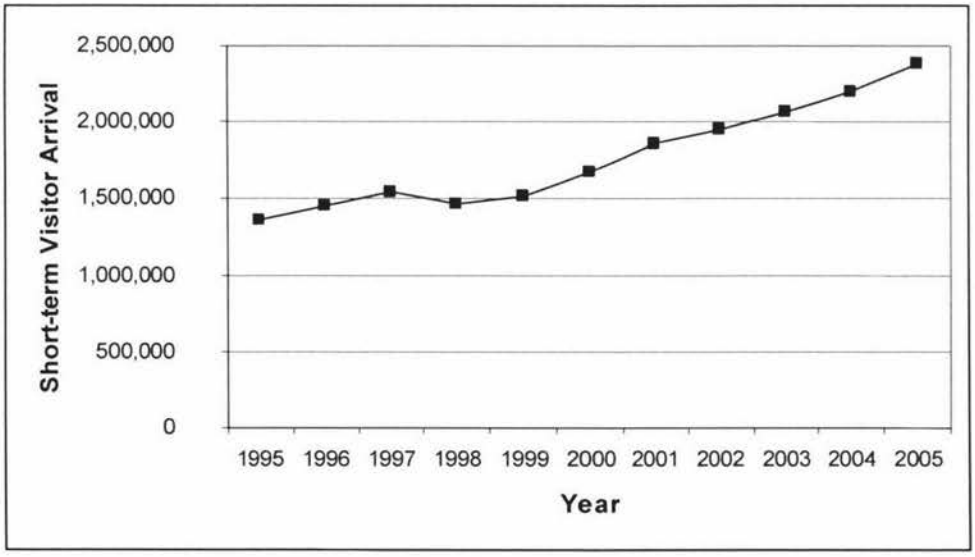
Cole (2000) employed EFA to quantify the sustainability of Manali, a rapidly urbanizing tourist destination in India. She found that the overall EF of Manali town increased over 450 % between 1971 and 1999, and was currently 25 times larger than its size. This suggested that Manali was relying on outside ecosystem to support their tourism industry and was moving away from its ecological sustainability. The EF of tourists (both international and domestic) was up to 13 times larger than that of the locals (Cole, 2000).

## 2.3 Tourism in New Zealand

### 2.3.1 Growth of Tourism

The New Zealand tourism industry has been growing steady. The number of short-term (less than 12 months) international visitors increased from just over 1million in 1993 (Gilling & Bailey, 1994) to 2,378,000 in 2005 (Fig. 3) (Statistics New Zealand, 2005a). By 2010, the number of international visitor to New Zealand is expected to be 3.1 million (Davies *et al.*, 2001; Tourism Research Council New Zealand & The Ministry of Tourism, 2004).

**Fig. 3 The short-term arrivals of overseas visitor to New Zealand last 10 years (year ended April) (Statistics New Zealand, 2005a).**




### 2.3.2 Economic Impacts of Tourism in New Zealand

In New Zealand, tourism is currently the largest foreign exchange earner and exceeds New Zealand's traditional income earners of dairy, meat, forestry and wool markets (New Zealand Tourism Board, 1996b). In the year ended March 2004, the direct

tourism value to New Zealand economy was $6.2 billion, with an indirect value of $5.8 billion (Statistics New Zealand, 2005b) (Table 3). International visitors spent $7.4 billion in the year ended March 2004 and is projected to grow to at least $9.4 billion in 2010 (Davies *et al.*, 2001). Since the tourism industry has grown extensively, over 16,500 companies are now involved in the New Zealand tourism industry (Tourism New Zealand, 1999a), 80 % of them are small companies employing fewer than five people (Davies *et al.*, 2001; Jones & Sleeman, 2002). In 2002, one in 12 jobs were tourism related and many of which were in small business away from the main commercial centres (Jones & Sleeman, 2002).

International educational tourism is the latest tourism sector showing the 'phenomenal' growth in a very short time in New Zealand especially from Asia. The number of international visitors for educational purposes reached an all-time high of 52,841 in 2002 (Covec Limited, 2004), generating $1.7 billion in revenue (Epstein, 2003). The educational travellers usually show travel behaviour distinct from conventional travellers. For example, educational travellers (namely students) stay longer in New Zealand (an average of 98.9 nights per visit compared to 19.3 for non-educational visitors) (Covec Limited, 2004) and often stay at one place and spend their time with local people (e.g., New Zealand families). In 2003, these educational travellers stayed approximately five times longer than non-education arrivals and spent about seven times as much money (Covec Limited, 2004).

In addition to the positive effects, there are some possible downsides of tourism in economy. The tourism industry is likely to be seasonal, which may cause difficulties attracting investment. The seasonality of tourism is of greater concern in developing countries (Mason, 1990). In New Zealand, 35 % of all international tourists arrive in the summer season (December to February) (Tourism Research Council New Zealand & The Ministry of Tourism, 2004) so seasonality may cause some employment problems. Manson (1990) suggested that land values at the popular destinations can increase dramatically because of demand for land for hotels and tourist facilities. This is a concern in Queenstown, for instance, where the land values were pushed up and many local residents are unable to purchase houses. In 2005, the median house price in Queenstown became the highest in New Zealand ($465,000 in August 2005) for the first time in the history, which is even more expensive than the largest city, Auckland (REINZ, 2005). This was due to the overseas investors purchasing land in that region.

**Table 3 Tourism contribution to New Zealand economy in the year ended March 2004 (Statistics New Zealand, 2005b).**

| | |
|---|---|
| Total tourism expenditure | $ 17.2 billion |
| International tourism expenditure | $ 7.4 billion |
| The percentage of export | 18.5 % (NZ's largest export earner) |
| Direct contribution to GDP | $ 6.2 billion (4.9 % of NZ's total industry contribution to GDP) |
| The estimated workforce in tourism | 102,700 full-time equivalent employees (= 5.9 % of total employment) |
| GST revenue | $ 1.3 billion |
| Indirect tourism value | $ 5.8 billion |

### 2.3.3 Social and Cultural Impacts

There are many possible positive and negative socio-cultural impacts from tourism. The socio-cultural impacts are not measured in EFA and difficult to quantify, but it is important to consider the sustainability of the tourism industry. Potential benefits of tourism in a small community include enhancing community pride, improvement of the public facilities, boost to local businesses, preservation of cultural heritage, growth and expansion of local economy, a focus on the local environment, creation of new jobs, encouragement of community involvement, and the provision of investment opportunities (Jones & Sleeman, 2002). Also, roads may be built or sealed for tourism purposes (e.g., the Milford Sound road in New Zealand). Manson (1990) stated that tourism may cause people to change their stereotyped view of foreigners and gain positive attitudes and may develop a respect for the culture and tradition of other people. Tourism also promotes the need to conserve areas of outstanding beauty with aesthetic and cultural value.

The possible negative impacts are also pointed out by Manson (1990). For example:

- Overcrowding that may cause pressure on transport and accommodation, therefore cause stress;
- Tourism may become a major employer and the traditional activities may decrease

(e.g., agriculture, horticulture or forestry); and

- Potentially challenging for host and tourists to coexist due to different values.

Other possible social effects of tourism are summarised in Table 4 from Blaschke *et al.* (1997). In addition, Yasufuku (2003) suggested both positive and negative effects from the cross-cultural tourist-host contact (Table 5).

In addition to these impacts, some negative perceptions towards 'Asian' migrants are developed in recent years with the increasing number of Asian population in New Zealand (including Japanese). The New Zealand tourism industry promotes New Zealand itself as 'friendly people' (New Zealand Tourism Board, 1996a), thus increasing racism within New Zealand towards Asian community might have negative impacts in the future.

**Table 4 Social effects of tourism (Blaschke *et al.*, 1997).**

| Types of effects | Explanations and Examples |
|---|---|
| Recreational opportunities | Tourism provides people new recreational activities. |
| Changes to community profile | Demographic structure changes due to tourism (related to size of host community and number of visitors. |
| Changes to community interactions | Locals feel swamped by tourists or feel marginalised threatened by changes due to growing tourism. |
| Reduced community stability | Large number of transient/seasonal workers putting social pressure on local communities.<br>Due to high migration, transient population fail to integrate with local population. |
| Social Interaction | Loss of social cohesion, development of a 'harsh' social environment with no 'heart' or 'personal touch'. |
| Changed community attitudes | Community becomes less friendly to tourists.<br>Negative attitudes develop as tourism grows, depends on size, scale, history, and importance of tourism to the community and varies between sectors of the community. |
| Improved community morale and self esteem | By successful tourism (e.g., revival of local festivals and events). |
| Environmentalism | Increased environmental awareness and protection. |
| Changes patterns of social and family role differentiation | Behaviour of people on holiday conflicts with the lifestyle of locals, especially those less well off. |
| Displacement | Locals feeling pushed out of own town by negative perception of foreign language in shops, proliferation of souvenir shops, and negative reaction to 'bus loads' of visitors. |
| Disruption to daily life | Crowding, displacement, pressure on infrastructure, unacceptable behaviour, locals trying to avoid tourists, etc. |
| Behavioural problems | Alcohol related behaviour problems caused by school leaves finding work easily in major tourism areas.<br>Tourism can 'demonstrate' hedonistic behaviour which is imitated by locals putting strain on locals. |
| Increased crime | Increased in crime as tourists are seen as easy target for robbery, etc. |
| Increased gambling | Problems of gambling, addiction and reduced social well-being by development and presence of casinos. |
| Health risks | Greater risk of importation of communicable diseases.<br>Higher incidence and transmission of disease (e.g., bird flu, HIV/AIDS, SARS). |
| Stress | Stress on locals who feel they always have to fight some |

| | |
|---|---|
| | new proposals. |
| Polarisation | Polarisation of the community into pro- and anti- tourism. |
| Perception of loss of control | Community sense of loss, feeling of being forgotten, sense of loss of control over own future.<br>Intrusion by visitors into quiet places. |
| Frustration at environmental effects | Frustration at negative effects from 'fly-by-night' operators. |
| Pressure on services | Increased risk of injury by adventure activities leads to increased stress on search/rescue and medical treatment. |
| Conflicting needs | Conflict between needs of tourists and locals resulting in interference with everyday living in local communities. |

**Table 5 Positive and negative effects from the cross-cultural tourist-host contact (Yasufuku, 2003).**

| Positive effects | Negative effects |
|---|---|
| Developing positive attitudes towards each other's culture | Developing negative attitudes towards each other |
| Learning about each other's culture and customs | Tension, hostility, suspicion and misunderstanding |
| Reducing negative perceptions and stereotypes | Isolation, segregation and separation |
| Developing friendship | Clashes of values |
| Developing pride in and appreciation, understanding, respect and tolerance for each other's culture | Difficulties in forming friendships |
| Increasing self-esteem of hosts and tourists | Feelings of inferiority and superiority |
| Psychological satisfaction with interaction | Communication problems<br>Ethnocentrism<br>Culture shock<br>Dissatisfaction with mutual interaction |

## 2.4 Tourism and Energy Use

Intense energy consumption is a major issue for the tourism industry. Tourism in New Zealand contributed six percent of national energy use in 1997/98 (Becken, 2004; Becken & Cavanagh, 2003; Becken, Simmons, & Hart, 2003). Many researchers, in particular Becken and her colleagues conducted a range of studies for energy requirements in tourism. They have examined the energy consumption in accommodation, tourism activities, and transportation.

### 2.4.1 Transportation Energy Consumption

Transportation is by far the most important source for energy demand in the New Zealand tourism industry (Becken, c2002). About 70 % of $CO_2$ emissions from the tourism industry come from transport, and domestic transport is the most important source of energy use and emissions (Becken, 2004). Tourists consume 23 % of the products supplied by the road passenger and rail transport industry, 17 % of the water transport industry, and 81 % of air transport (Becken, 2002).

According to Becken (2002), the most energy efficient transportation method in terms of energy use per passenger kilometre is coaches mainly due to the high occupancy rates (Table 6). While rental cars and motorcycles are also efficient transportation methods because of their own fuel efficiency. Rental cars are more fuel efficient (6.7L/100km) than the average New Zealand vehicle as overall average fuel consumption rate is 9.2 L/100km for petrol car (Table 7) (Ministry of Transport, 1995). This was because the rental cars are on average 2.8 years old in New Zealand (Becken, 2002). The worst transportation mode is ferries and air travel.

**Table 6 Energy consumption for different transportation in New Zealand (Becken, 2002; Becken & Cavanagh, 2003).**

| Transport type | Energy per vehicle kilometre (MJ/vkm) | Average occupant | Energy use per passenger kilometre (MJ/pkm) |
|---|---|---|---|
| Coach (tour bus) | 23.1 | 22.9 | 0.32 |
| Train | - | - | 0.38 |
| Scheduled coach | - | - | 0.51 |
| Shuttle bus/ van | 3.22 | 5.46 | 0.56 |
| Backpacker bus | 23.1 | 39.8 | 0.58 |
| Motorcycle | 1.22 | 1.4 | 0.87 |
| Rental car | 2.35 | 2.5 | 0.94 |
| Private car | 3.25 | 3.16 | 1.03 |
| Hitchhiking | 3.25 | 3.16 | 1.03 |
| Recreational boat | 9.62 | 5.49 | 1.75 |
| Camper van | 4.54 | 2.2 | 2.39 |
| Domestic Air | - | - | 2.54 |
| Cook Strait Ferry | - | - | 2.63 |
| Other ferries | - | - | 3.53 |
| Stewart Island ferry | - | - | 8.7 |

**Table 7 The average fuel consumption per 100 km (Ministry of Transport, 1995).**

| Vehicle type | Fuel consumption rate (L/100km) | Vehicle type | Fuel consumption rate (L/100km) |
|---|---|---|---|
| Car (petrol) | 9.2 | Car: ex-overseas (petrol) | 9.5 |
| Taxis (petrol) | 9.0 | Car rental (petrol) | 6.7 |
| Car (diesel) | 6.6 | Motorcycle | 3.5 |
| Shuttle buses/Vans (petrol) | 9.7 | Shuttle buses/ Vans (diesel) | 7.9 |
| Bus (petrol) | 47.9 | Bus (diesel) | 62.3 |
| Camper vans (diesel) | 11.8 | Camper vans (petrol) | 13.4 |
| Car (CNG)* | 8.2 kg/100km | Car (LPG)** | 7.7 kg/100km |

* Compressed Natural Gas

**Liquefied Petroleum Gas

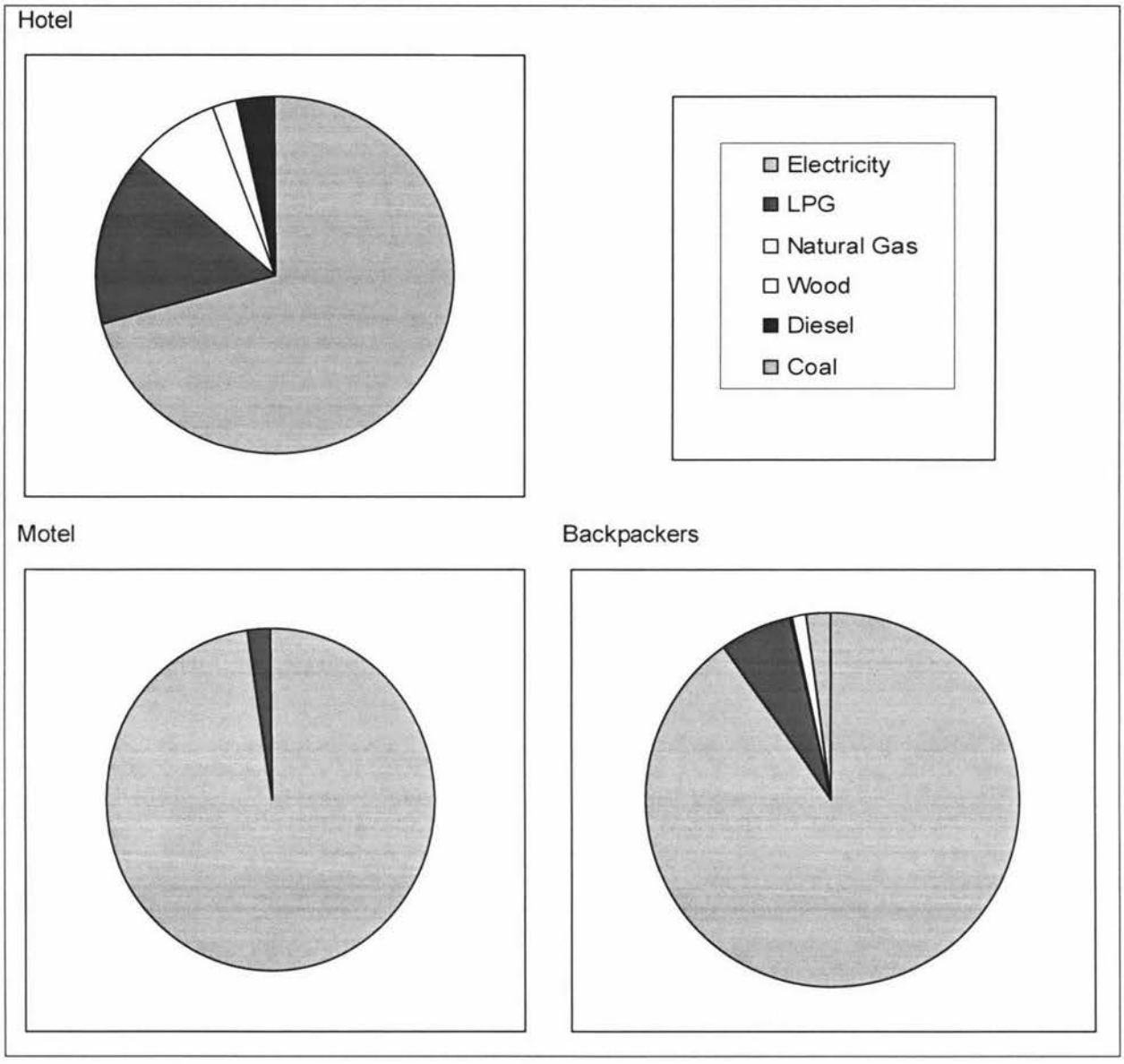
### 2.4.2 Accommodation Energy Use

Accommodation is another main energy consuming sector in the tourism industry. Becken *et al.* (2001) measured the energy use in the accommodation sector and compared five different accommodation categories (hotels, bed and breakfasts, motels, backpackers, and campgrounds). Overall, hotels were the highest energy consumers and campgrounds were the lowest (Table 8). They also compared the energy intensity per floor area ($m^2$) and per visitor-night in these five accommodation types. Hotels and backpackers required more energy per floor space while hotel and Bed and Breakfasts (B&Bs) were the most energy intense accommodations in terms of per visitor-night. This study showed that motels were an energy efficient accommodation type. Within each accommodation type, Becken (2000) found that the average hotel spends most of its energy on heating (26 % for space and 19 % for water) and refrigeration (26 %). B&B spends approximately half of their energy on water heating (47 %) and 20 % on space heating, which are comparable to household energy consumption patterns. Hotels are greater energy users than other accommodation types both in terms of annual energy consumption and per visitor night consumption. The sources of energy used by accommodations were examined by Becken and Cavanagh (2003). They studied the energy sources in hotels, motels and backpackers, and electricity was the main sources of energy in all accommodation types while hotels used more diverse energy sources (Fig. 4).

**Table 8 The energy intensity of each accommodation type (Becken *et al.*, 2001; EECA, 2000).**

| Accommodation type | (MJ/visitor night) |
|---|---|
| Hotel (including luxury lodge, motel with restaurant) | 155 |
| B&B (incl. farm-stay, home-stay, budget hotel, boat) | 110 |
| Motel (without restaurant) | 32 |
| Backpacker & YHA | 39 |
| Campground (incl. holiday park, hut, free camping) | 25 |
| Home (incl. private and rental home, apartment) | 41 |

**Fig. 4 Energy sources to total energy use by accommodation type (Becken & Cavanagh, 2003).**




### 2.4.3 Energy Consumption in Tourist Activities/attractions

Tourist attractions and activities are diverse and consist of many products and services; thus there is no existing clear definition of what constitutes a tourist attraction (Becken & Simmons, 2002). Becken (2001b) categorised tourist attractions and activity. Tourist attractions include buildings (e.g., historic buildings and museums), park, amusement (e.g., theme park and gondola), industry (e.g., farm show

and winery), and natural attractions (e.g., geothermal attraction and glow worm caves). Tourist activities are air activities (e.g., scenic flight), marine activities (e.g., diving, whale watching), adventure recreation, and nature recreation. Also tourist entertainments, such as shopping and Maori performances, are important attractions.

Overall, tourist attractions consume the least energy (411 GJ per year) and entertainment requires the most energy (1,599 GJ per year) (Becken, 2001b; Becken & Simmons, 2002). However, tourist activities are most energy intense in terms of energy use per tourist (95.6 MJ/tourist) and attractions are the least energy intense (6.2 MJ/tourist) although the energy requirements vary (Becken, 2001b). Fossil fuels are the most important energy sources in activities while electricity plays only a minor role. The most energy intense tourist activity is the air activity (air sports, scenic flights, etc.) followed by motorised water activity (e.g., jet boat, sailing, boat cruise, sea fishing, and whale watching). These activities require approximately 10 times more energy than most other tourist attractions/ activities (Table 9).

**Table 9 Energy intensity for tourist attractions/activities (Becken, 2001b; Becken, Simmons et al., 2003b).**

| Recreation Category | Energy Intensity (MJ/visit) | Recreation Category | Energy Intensity (MJ/visit) |
|---|---|---|---|
| Buildings (museum, art gallery, historic site) | 3.5 | Other entertainment (bar, casino, shopping) | 6.9 |
| Parks (botanical garden, zoo) | 8.4 | Nature attraction (geothermal attraction, glow worm caves) | 8.5 |
| Industry (farm show, other farm attraction, wine trail) | 11.5 | Performance (cinema, concert, Maori performance, theatre) | 12 |
| Amusement (experience centre, gondola ride) | 22.4 | Nature activity (cycling, dolphins, horse riding, golf, lake fishing, walking, wildlife) | 26.5 |
| Adventure activity (bungee, climbing, heli-ski, kayak, mountain biking rafting) | 35.1 | Motorised water activity (jet boat, sailing, boat cruise, sea fishing, whale watching) | 236.8 |
| Air activity (air sports, scenic flights, whale watching by air) | 424.3 | | |

### 2.4.4 Comparisons of Energy Use International and domestic tourists

Becken *et al.* (2003a) conducted a study of energy consumption by domestic and international tourists in New Zealand. They surveyed 180 domestic and 273 international tourists in West Coast of New Zealand and estimate their energy consumption in accommodation, transport and activities. They found that international tourists consume significantly more energy than domestic (Table 10). However, daily energy consumptions of domestic and international tourists were similar (Table 11). Therefore, they concluded that the trip length is one factor that determines the 'energy bill'. Transportation was the dominant motive of energy requirement for both international and domestic tourists (73 % and 65% respectively) (Becken, Simmons *et al.*, 2003a).

The energy consumption patterns have changed over time. Both international and domestic tourists required less energy per tourist in 2001 compared to 1999 mainly due to the increase in energy efficiency for domestic air travel and other transportation methods. Energy use per tourist for international visitor was 3,385 MJ in 1999 and 3,082 MJ in 2001; while it was 1,053 MJ in 1999 and 950 MJ in 2001 for domestics (Becken & Cavanagh, 2003). The total distance travelled by an average international tourist in 2001 was 1504 km (median of 1143 km), and the average domestic air travel distance by one international tourist in 2001 was 375 km/tourist (Becken & Cavanagh, 2003).

**Table 10 Energy use by domestic and international tourists (MJ/tourist trip) from survey of 180 domestic and 273 international tourists in West Coast, New Zealand (Becken, Simmons *et al.*, 2003a).**

| | | Transport | Accommodation | Attraction/ activities | Total energy use |
|---|---|---|---|---|---|
| Domestic | Mean | 1,755 | 360 | 360 | 2,475 |
| | Median | 1,231 | 287 | 169 | 1,777 |
| | Min | 0 | 25 | 0 | 269 |
| | Max | 9,326 | 1,270 | 3,202 | 10,633 |
| International | Mean | 5,327 | 1,770 | 1,067 | 8,163 |
| | Median | 4,433 | 1,510 | 878 | 7,290 |
| | Min | 101 | 195 | 0 | 1,336 |
| | Max | 20,692 | 6,476 | 6,281 | 28,261 |

**Table 11 Energy use of an average domestic and international tourist per day (Becken, Simmons *et al.*, 2003a).**

| | Domestic tourists (MJ/tourist/day) | International tourists (MJ/tourist/day) |
|---|---|---|
| Mean | 341 | 314 |
| Median | 261 | 273 |
| Minimum | 54 | 39 |
| Maximum | 1379 | 1179 |

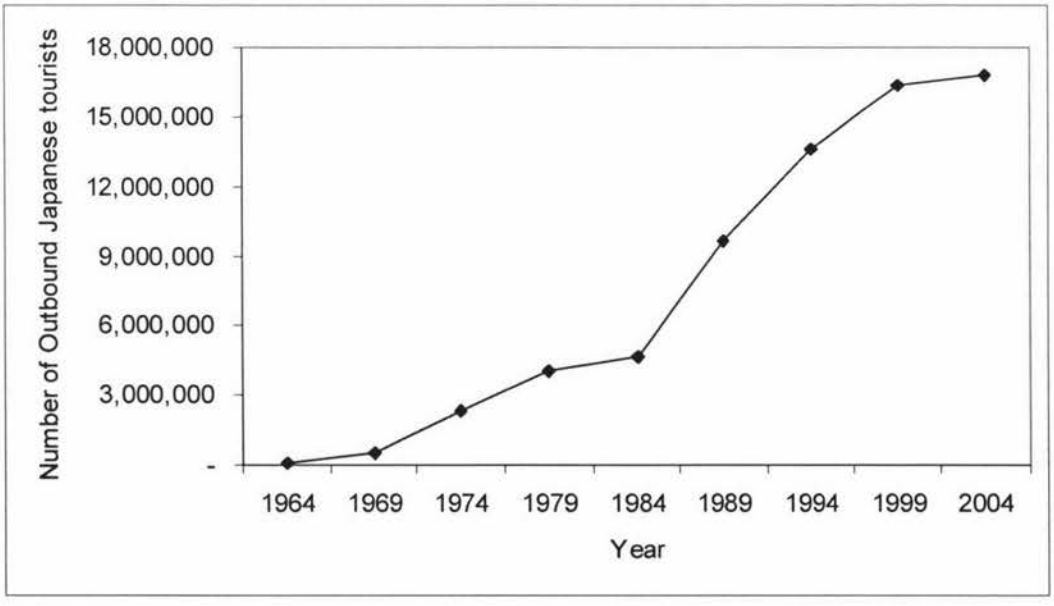
## 2.5 Japanese Outbound Tourism

### 2.5.1 History

Growth of Japanese outbound tourism in the post-World War II was remarkable with several motivations such as the economic growth and political easement (Fig. 5). The Department of Sport, Recreation and Tourism (1986) suggested four factors that contributed to the early growth in outbound tourism in Japan. These were:

- Increases in discretionary income resulting from the rapidly growing Japanese economy;
- More leisure time;
- Decreases in airfares accompanying the introduction of wide-bodied aircraft; and
- Introduction of wholesale package tours.

**Fig. 5 Change in the number of outbound tourists from Japan (Isogai, 2004; Japan National Tourist Organization, 2005; Prime Minister's Office, 1997).**




Cha *et al.* (1995) also suggested the following as major contributions to the boom in Japanese outbound travel:

- Japan's strong and stable economy;

- The strength of the yen (currency in Japan);
- Increasing allowances on the amount of foreign currency for tourist use;
- Overseas investment in the hospitality industry;
- Active involvement of the Japanese government in international travel and tourism activities;
- The deregulation of the Japanese airline industry in 1986;
- Increased tax breaks for duty-free shopping in 1987;
- Bilateral visa waiver agreements in international travel; and
- Expansion of international air capacity.

Until 1964, there were restrictions on Japanese outbound travel through currency regulation (Department of Sport Recreation and Tourism, 1986). There was a limit ($500) in the amount of money Japanese travellers could carry overseas (Mak et al., 2004). In order to promote inbound tourism, the government did not allow the Japanese to travel abroad for recreation purposes (Mak *et al.*, 2004). Most passports were issued and valid for one trip only, and any international travel had to be approved by a Ministry of Finance committee, while travel for pleasure was not regarded as a valid reason for approval (Mak *et al.*, 2004). Consequently, fewer than 128,000 Japanese travelled abroad in 1964 (Mak *et al.*, 2004). However, things started to change after Tokyo Olympics. The ban on overseas pleasure travel was finally eradicated and the limit on the amount of money travellers could carry was gradually increased (i.e., $700 in 1969, $1,000 in 1970, $1,500 with ¥3,000 in 1975, and $3,000 with ¥100,000 in 1976), and the financial restrictions were finally eliminated in 1978 (Mak *et al.*, 2004). Once these limitations were removed, an increase in the number of outbound travellers was recorded.

Later, the Japanese government started promoting outbound tourism by introducing several programmes, which contributed to the increase in the number of outbound tourists (Polunin, 1989). 'Ten Million Programme' was launched by the Ministry of Transport of Japan in 1986-7 aimed to almost double the number of Japanese outbound tourists from 5.5 million in 1986 to 10 million by 1991 (which was achieved a year earlier). The 'Two-Way Tourism 21' was launched after they achieved the goal of the previous programme, aiming to facilitate tourist flow to and from Japan for mutual understanding between the Japanese and people from other countries (Hashimoto, 2000; Nozawa, 1992; Polunin, 1989).

The Boeing 707 was first introduced commercially in 1958 and an 'economy class' was established and this extension of the tourist class made for greater seat density (McKenna, 1997). In addition, the Boeing 747 jumbo jet was introduced in 1970, which made large group of package tours possible (Mak *et al.*, 2004). Within a decade, the number of outbound travellers increased to over two million, with more than 80 % were for pleasure (Mak *et al.*, 2004). By the early 1970s, the tour costs to many destinations had halved compared to in 1965 (Mak *et al.*, 2004).

The Japanese economy has grown to be one of the world's leading market economies in recent times, with a Gross Domestic Product (GDP) of US$4,326 billion in 2003 (The World Bank, 2004). In early 1950s, Japanese per capita consumption was roughly one fifth of that in the United States (Web Japan, c2002). However, the Japanese economy had an average growth rate of 8 % over the following two decades and Japanese economy became the world's second largest in 1968 (Central Intelligence Agency, 2005; Web Japan, c2002). In 2001, Japanese per capita national income was US$24,038, ranking fifth among OECD nations (Web Japan, c2002), accounting 12 % of global nominal GDP in 2003 (Business Standard, 2005).

The economic growth has brought changes in lifestyle and a reduction in work hours causing people to pursue recreation facilities. The saving rate in Japan also decreased and people seemed to be spending more compared with the immediate post-war period (McKenna, 1997). Consumer attitudes in Japan also changed from a functional austerity to a luxurious consumerism and more personal consumption in 1960s (McKenna, 1997). With the rapid economic development, resource consumption rates also increased dramatically after the World War. Wada (1999) compared the EFs of Japan in 1880 (the pre-industrial era) and 1991. He found that the EF had changed from 0.4 ha per capita in 1880 to 4.7 ha per capita in 1991 (Wada, 1999).

The extreme high cost of the land and properties in recent times may be another explanation of growth in outbound tourism since many Japanese cannot afford to buy houses. As a result of high housing prices, they are more likely to spend money on leisure (Milner et al., 2000; Plimmer, 1982). In addition, the Japanese government is promoting more leisure time for Japanese. The research showed that Japanese worked the longest hours among the industrialised nations in 1980s (Ministry of Health Labour and Welfare, 2004). The Japanese government has begun promoting five working days a week, full use of paid annual vacation, long weekends,

and a shortening of working hours (Nishiyama, 1996). Some companies and government sectors sometimes offer incentives to their employees with many years of continuous service as rewards of overseas travel.

The outbound tourism industry is relatively new to Japan and is still growing. For instance, during 'Golden Week' holiday in 2005 (one of the major holiday times in Japan from 28th April to 9th May) the number of people used Narita International Airport (the largest international airport in Japan) reached a record high of 856,000 people (Kyodou Shimbun, 2005e) and approximately 330,000 people used Kansai International Airport (Kyodou Shimbun, 2005g) during the same week.

Future outbound Japanese tourism may be facing a new era. Many developed nations are experiencing an aging population, and Japan is no exception. In 1920, the average age of Japanese was 26.7 years, while it is 40.1 years today (You & O'Leary, 2000). It is estimated that one in three will be an elderly citizen in Japan in 2050 (You & O'Leary, 2000). This aging population phenomenon may have a significant influence on future world tourism industry. Since the age can have influences in the behaviour of the tourists, the travel styles, activities, and popular destinations might change with more senior travellers. The older people are thought to have disadvantages for travel in terms of physical energy and mobility; however, they also have some advantages. You & O'Leary (2000) studied the aging effects in behavioural changes of Japanese travellers and the study showed that they are likely to be more free from family and work responsibilities and thus, have more free time for leisure activities and more disposable income. This indicates the advantages in family lifecycle concept. Also travel propensity for today's senior people seems to be higher than previous age cohorts due to medical advances, improved diet, and housing and public health conditions.

Mak *et al.* (2004) also investigated the likely effects of aging population on Japanese outbound tourism. They projected that the population in Japan is likely to be smaller due to the lower birth rate in the future; the smaller population also means that fewer people may be travelling in the future. Aging population also may result in slower economic growth due to a smaller work force with fewer younger people.

### 2.5.2 Characteristics of Japanese Travellers

For many Japanese travellers, visiting natural and scenic attractions and shopping were two main activities during their travel (World Tourism Organization, 2000). Purchasing souvenirs was probably one of the characteristics of Japanese (and many other Asian) travellers. A study in Australia showed that Japanese typically spend 50 % of money on other people and the average expenditure on souvenir shopping was AUS$652 in Australia in 1997 (March, 2003). This was because they buy souvenirs for friends, neighbours, colleagues and others, and they buy little for themselves. There is a historical and cultural explanation for this behaviour. Watanabe (1982) stated that when they were not mobile long ago, whenever someone had a chance to go somewhere, neighbours and colleagues used to give cash or something to help travellers finance their journeys. While these travellers were away it was those people (neighbours and colleagues) looked after their homes and businesses. Therefore, travellers were obliged to bring back some small gifts on their return for appreciation (Watanabe, 1982). This trend still applies in modern Japan, and that is why Japanese people do a lot of shopping wherever they travel. Park (2000) studied the souvenir shopping behaviour of Japanese and Koreans. According to his study, the role of souvenirs and the motivation for purchasing are categorized as follows:

- A means of assisting social intercourse;
- As a means of communication;
- While on vacation, souvenirs allow us to feel a bond of the heart and share the feelings and circumstances with those who were not able to go on vacation together with us;
- A mirror that reflects the gift giver's social understanding and etiquette;
- Evidence that one has been to a region or a country, at the same time it is proof that ones know something that is known to others. It derives from one's desire to be paid due recognition and difference from other people;
- Due to a guilty conscience of going off and having fun all by oneself; and
- As a return present to the person who gave *senbetsu* (= money given to the travellers before the trip).

Many Japanese travellers still buy souvenirs for family and relatives, friends, and

colleagues, but fewer people may actually buy souvenirs for their neighbours recently. According to Nishiyama (1996), the most popular souvenir items among Japanese travellers are liquor, cigarettes, perfume, jewelry, watches, cigarette lighters, pens, ties, bags, shoes, leather goods, sports equipment, clothing, fruit, and other food items. Whereas, the four most popular purchases of Japanese travellers during their overseas trip are chocolate/candy, T-shirts, clothing and tobacco according to March (2003).

Japanese visitors tend to stay for shorter periods but they have a tendency to visit several places in one trip (World Tourism Organization, 2000). Many Japanese tourists have a taste for tours that are so tightly arranged that they can see as many famous places as possible (Oyamada, 1982). Their itinerary often includes dinner at Japanese restaurants and souvenir shopping at 'Japanese spoken' shops (Oyamada, 1982). However, this view is changing slowly and the proportion of free independent travellers (FITs) is increasing among the Japanese travellers even though Japanese remain less likely to be FITs compared to visitors form other countries (Ministry of Tourism, 2005a). The FIT share of outbound trips has risen from 20 % in 2000 to 45 % in 2004 (Cockerell, 2004). This may be because they are becoming more confident to travel abroad since many Japanese have started travelling in 1970s. In fact, 50 % of Japanese coming to NZ have already experienced overseas travel and feel confident or secure enough to travel by themselves (Gnoth, 2003; JTM/ TFWA, 2003). However, Gnoth (2003) pointed that one reason that Japanese tourists frequently travel in groups is because of their strong social cohesion. This cohesion may be different from most Europeans who tend to emphasize their individualism. Their collectivism is also noted by Money & Crotts (2000) and Kim & Lee (2000). Japanese tend to enjoy the environment with groups (Gnoth, 2003). Nishiyama (1996) also suggested that Japanese people travel with groups for both cultural and practical reasons. The group discounts and other special discount for tour group makes the travel more economical and often travel agents and tour escorts provide a much better service to larger groups than to individuals (Nishiyama, 1996). On the other hand, Western values and the idea of individualism have become more and more prominent in Japan and this may be one of the reasons for the increase in the number of Japanese FITs.

Many studies indicate that Japanese are particularly concerned about personal safety (Japan Association of Travel Agents, 2001) and are more sensitive to international issues compared with other countries. Females are particularly sensitive

to international events, such as Sever Acute Respiratory Syndrome (SARS), war, and terrorism (Takamatsu & Hayano, 2004). The 2004 New Zealand International Visitor Survey stated "During 2003, the Japanese visitor market was one of the most affected by SARs, and took the longest in terms of visitor numbers to return to growth after the end of the outbreak"(Ministry of Tourism, 2004). In 2005, for instance, the number of Japanese outbound travellers going to South East Asia decreased due to the earthquakes (Kyodou Shimbun, 2005c). Also the number of Japanese going to China decreased after the demonstrations against the Japanese history textbook (Japan Tourism Marketing Co, 2005; Kyodou Shimbun, 2005a, 2005b, 2005c, 2005d, 2005f).

### 2.5.3 Japanese Tourist in New Zealand

#### *2.5.3.1 Growth of Japanese tourism market in New Zealand*

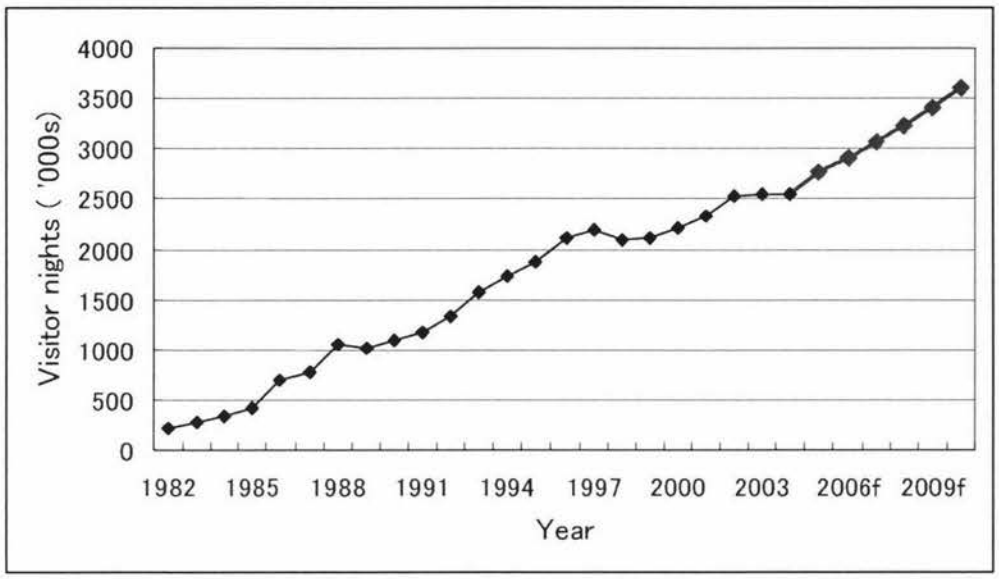
Since direct flights between New Zealand and Japan started operating in 1980, Japanese tourists started arriving in New Zealand (Johnson, 1982). Japanese arrivals showed strong growth in the 1980s and early 1990s (Covec Limited, 2004). Between 1982 and 1989, visitor nights increased 362 %, 110 % between 1989 and 1996, and 21 % between 1996 and 2003 period (Covec Limited, 2004). The Japanese market grew from 217,000 visitor nights in 1982 to over 2.5 million in 2003 and is forecast to increase to over 3.6 million by 2010 (Fig. 6) (Covec Limited, 2004). In terms of the visitor numbers, only around 3,000 Japanese arrived in New Zealand in the early 1970s, then the number of arrival increased to 20,000 in the early 1980s (Plimmer, 1982), and it reached 160,000 per year in recent time. The number of Japanese visitor arrival is projected to reach 200,000 in 2010 (Davies *et al.*, 2001).

Approximately 165,000 Japanese visited New Zealand each year (Ministry of Tourism, 2005a), which is less than one percent of the total Japanese outbound travellers. The view of Japanese travellers towards New Zealand as a destination has changed somewhat since the 1980s. In the 1980s, New Zealand was seen as only a part of the South Pacific and many Japanese visited other South Pacific countries (e.g., Australia) before they come to New Zealand (Langford, 1982). This means that many Japanese stayed for shorter periods in New Zealand. However, more and more

Japanese now see New Zealand as a sole destination, rather than a part of Pacific and 84 % of Japanese were visiting only New Zealand during their holiday in a year ended March 2005 (Ministry of Tourism, 2005a). By 2008, the number of Japanese visitor to New Zealand is estimated to be around 213,000 with an annual average increase of 5.2%. They are expected to stay longer (over 18 days), and spend more (around $1.2 billion) by 2008 (Burton, 2003). New Zealand became more popular especially for those in their 30s and is in the top 10 popular destinations for them (Takamatsu & Hayano, 2004).

Asian tourists (including Japanese) generally travel to traditional New Zealand tourism destinations, namely, Auckland, Rotorua, Christchurch, and Queenstown, and the travel routes of Asian tourists are less diverse than that of European tourists (Forer & Simmons, c1997). However, their travel behaviour shows changes particularly among the younger travellers and travellers with more experience in overseas travel (Forer & Simmons, c1997). While some 30 % of the outbound Japanese market still prefer to travel with escorted tours or groups, most are confident, independent travellers who have researched their trip and are knowledgeable of what is on offer and where they what to go (JTM/ TFWA, 2003; Tourism New Zealand, 1999b). The number of Japanese FITs has then increased in recent years. The FIT share of overall Japanese outbound trips has risen from 20 % in 2000 to 45 % in 2004 (Cockerell, 2004). In New Zealand, only 17 % of Japanese travellers were FITs in 2001, but it increased to 31 % in 2005 (Ministry of Tourism, 2005a). "Free-time" packaged tours (packages with independent components) are more popular among the 'office ladies' (i.e., young female Japanese travellers) segment (Milner *et al.*, 2000).

**Fig. 6 Visitor nights from Japan since 1982 to 2003 (actual) and 2004 to 2010 (forecast) (Covec Limited, 2004).**

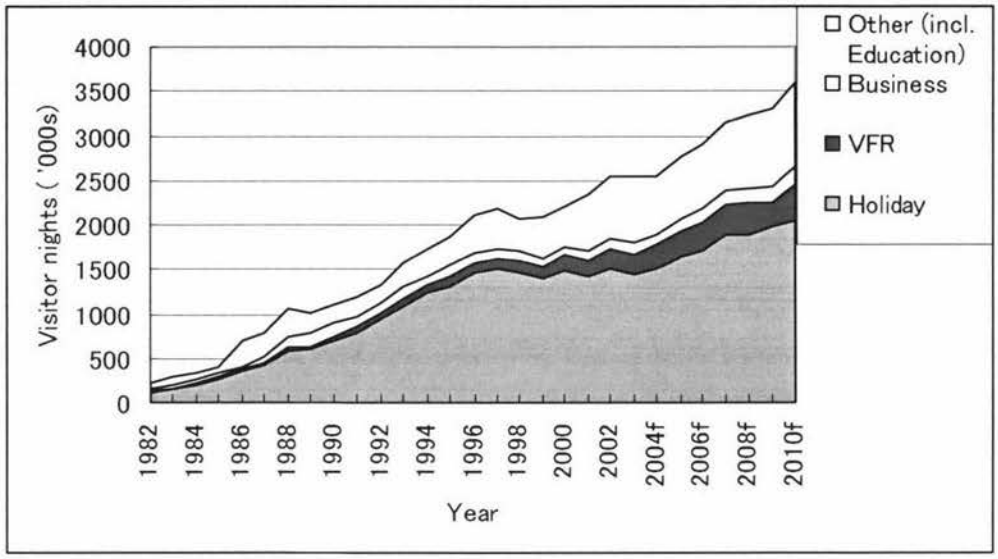



### *2.5.3.2 Segmentation of Japanese tourist in New Zealand*

Tourists can be divided into different segments depending on their age, gender, travel style and purposes of their visit. The segmentations can be helpful to predict the behavioural patterns (see Introduction).

Holiday travellers are the largest segment of Japanese tourists, while educational travellers are rapidly growing segment (Fig. 7) (Covec Limited, 2004). Educational visitors tend to stay longer, often encourage their family and friends to visit, and their arrival is not concentrated solely in the peak season, which enables a better spread of visitors year round (New Zealand Tourism Board, 1996a). The overseas school excursion market is also growing fast in Japan (Tourism Australia, 2005). Although it is less than one percent of total outbound (in 1996), New Zealand has strong appeal to school excursion group, and this segment may balance seasonality (New Zealand Tourism Board, 1996a). Honeymooners are also important Japanese segment in New Zealand as they are probably the most profitable segment as they are the biggest spenders on shopping (March, 2003).

**Fig. 7 Visitor nights from Japan by purpose ('000s) (Covec Limited, 2004).**



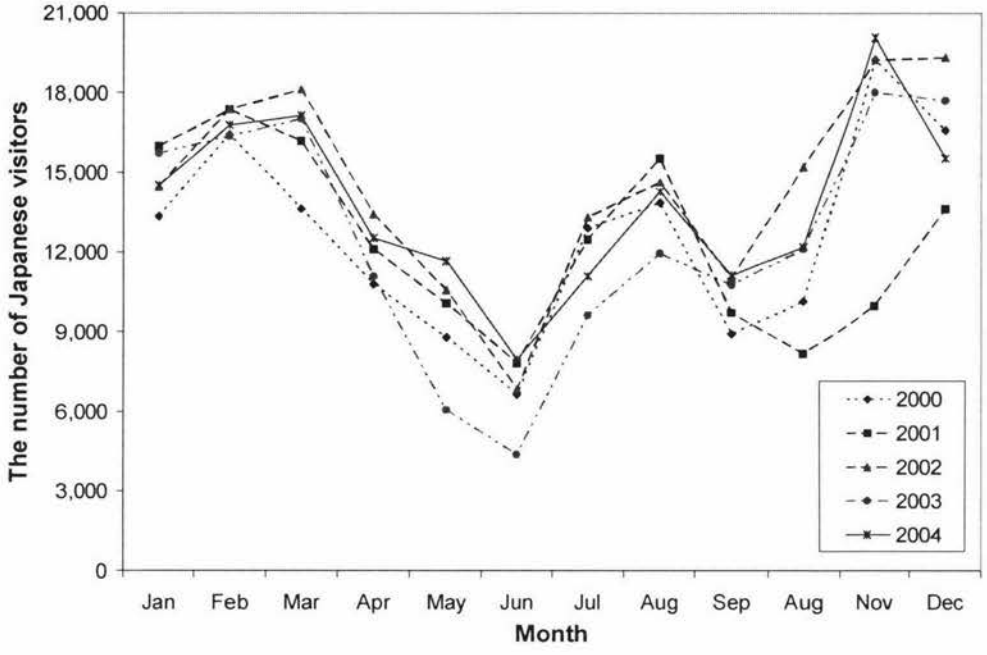

### *2.5.3.3 Economic contribution of Japanese travellers in New Zealand*

The Japanese travellers were ranked third largest spenders in New Zealand after Australia and the UK and the total expenditure by Japanese visitor was $649 million in the year ended April 2005 (Tourism Research Council New Zealand, 2005b). The total expenditure by Japanese travellers is expected to reach $1.03 billion by 2010 (Covec Limited, 2004). Japanese travellers were one of the biggest spenders on the basis of total expenditure per visit. On average, one Japanese tourist spent per day $169 in the year ended March 2005 (Ministry of Tourism, 2005b).

### *2.5.3.4 Seasonality of Japanese arrivals*

With the exception of 2001, November is the most popular month for Japanese travellers arriving in New Zealand (Fig. 8) (Japan National Tourist Organization, 2005; Statistics New Zealand, 2005a). June always recorded the lowest number of travellers to New Zealand from Japan. There are three peaks (March, August and November) in terms of the number of Japanese visitor's arrivals. March is Japanese spring school holiday and August is Japanese summer school holiday with 'O-bon' holiday (five days public holiday).

**Fig. 8 Seasonality of Japanese visitors to New Zealand (Japan National Tourist Organization, 2005; Statistics New Zealand, 2005a).**




### *2.5.3.5 Special requirements of the Japanese tourists in New Zealand*

The Japanese diet is very different to New Zealand's typical diet. For instance, the traditional Japanese breakfast menu consists of rice, green tea, raw egg, a few sheets of seaweed, pickled vegetable, and miso soup (Boardman, 1982). Although Japanese diet is changing towards more western style particularly among young Japanese, many people (especially older generation) still prefer traditional diet. Japanese feel that New Zealand food is oily and over spiced and too heavy in animal fats (Boardman, 1982). According to Nishiyama (1996), many Japanese visitors are 'curious gourmets' who want to taste all kinds of food and beverage and they also like to dine at a few fine restaurants. They like to have American, Chinese, Japanese, Italian, French, Thai, Vietnamese, and many other different ethnic cuisines. However, most Japanese people cannot stand more than a few days without having Japanese food or they look for Chinese restaurants when they get tired of eating Western cuisine (Nishiyama, 1996).

Japanese travellers generally consume a large amount of water. Watanabe (1982) pointed out that Japanese take baths rather than shower practically every day, not because Japanese people are obsessive about cleanliness, but because the water

was limitless. For this reason, some travel companies included the accommodation (especially hotels) with bathtubs, and indicate that 'bathtub available' in the tour promotion literature.

Popular activities and attractions for Japanese travellers vary with their age, gender, income, and occupation. However, particularly popular activities/attractions for many Japanese tourists include: nature and scenery, historical sites and famous architectures, art galleries and museums, amusement parks and entertainments, outdoor sports, rest and recreation, and gambling. Golfing is one of the most popular sports among the Japanese travellers. Due to the shortage of golf courses in Japan, it is difficult for golfers to find playing time and it is also very expensive in Japan and very few of them can afford to do so (Boardman, 1982; Nishiyama, 1996). Similar reasons apply horse-riding, scuba-diving, and farm visit (Boardman, 1982).

Japanese travellers are generally concerned about their ability to speak English as it can be a barrier. They are also concerned about how they will be received in a foreign country as 'Asian' visitors (Tourism New Zealand, 1999b).

# CHAPTER THREE:

# *RESEARCH METHODS*

## *3.1 Introduction*

The Ecological Footprint Analysis (EFA) of Japanese travellers undertaken in this study is a consumption-based calculation. To gather information about the resource consumption of the Japanese travellers in New Zealand, I conducted the survey; organised a six-day trip for a group of 14 Japanese travellers and travelled with them; joined a full-day Waitomo tour from Auckland; and collected a range of package tour itineraries from travel wholesalers/ retailers. Further, literature reviews on Japanese and New Zealand tourism and resource consumption patterns of tourists were carried out. Once information was gathered, EF was calculated and several statistical analyses were employed to determine any patterns.

Tourism is an unusual industry and is not easy to define. The tourism industry is defined by the demand-side perspective, unlike many other industries which are defined by the supply-side perspectives and nature of the products and services they provide (Collier & Brocx, 2004). The tourism industry includes a wide range of other industries and involves many organisations. Definition of tourism is often slightly different by organisations or individuals. World Tourism Organisation (WTO) defines tourism as "the activities of persons travelling to and staying in places outside their usual environment for not more than one consecutive year for leisure, business and other purposes". Different authors tend to have different definitions for 'tourist' and some authors do not include visitors for the purposes of education and business. In this study, I applied the definition of tourism from WTO, thus 'tourist' includes visitors for education and business as well as holiday travellers, but they were treated as different segments of the tourists for the analysis.

## 3.2 Survey

The questionnaire was designed to gain an understanding of the resource consumption patterns of Japanese travellers and their travel behaviour during their trip in New Zealand as well as some general information about tourists themselves (Appendix 1). The questionnaire was planned to be as short and easy as possible to increase the reply rate; thus the questions were focused on information not available from other sources. The questionnaire was written in Japanese so it would be easier for the Japanese travellers to answer the questions.

The questionnaire had 14 questions, of which four were general questions. It asked about accommodation type as the energy consumption pattern generally varies among the accommodation type as illustrated in other studies (Becken, 2000; Becken *et al.*, 2001; EECA, 2000). A question about the meal types was used to estimate the energy consumption. The next question asked about other food items (apart from their meals) and goods purchased. The questionnaire ended by asking about their travel modes and demographic information.

Survey questionnaires were delivered from July 15th to 19th 2005 at Auckland International Airport Air New Zealand/ Japan Airlines check-in counters (both individual and group counters). I approached the Japanese travellers who were about to leave New Zealand and asked if they would undertake the survey. If they were, I gave them a questionnaire with free postage envelops for reply from Japan and New Zealand. They could fill out the questionnaire when they were waiting for their flights, during the flight or once they arrived in Japan. A total of 262 questionnaires were handed over to the Japanese travellers.

## 3.3 Pilot Study

I organised a trip for a group of 14 Japanese tourists, consisting of my family and their friends, and I travelled with them. The group travelled around New Zealand for six days from seventh to the 12th February 2005. The itinerary was structured according to their requests (where they want to visit, what they want to do, etc.) and it included some of the popular destinations and 'must-do' activities for Japanese tourists, such as Waitomo Caves Tour and Mt Cook National Park (Appendix 2).

During the trip, I estimated resource consumption and observed their behaviour to help clarify the detail of resource requirements by Japanese tourists (Table 12). In addition, survey questionnaires were delivered at the end of the trip (a night before they departed from New Zealand). The initial questionnaire was slightly different from the survey conducted in July at Auckland International Airport and there were some extra questions. These questions included their household incomes, reasons to choose New Zealand as a travel destination, amount of money spent on souvenir shopping, and what they ate during the trip.

There were some concerns about the reliability of information to use in the analysis as this group might not represent the 'typical' pattern of Japanese tourists in New Zealand since they were not randomly picked tourists. Therefore the results were used mainly as supporting information. However, travelling with a group of Japanese tourists provide me good opportunities to closely observe their behaviour and resource consumption pattern.

**Table 12 Information on resource consumption estimated and other things noted during the trip.**

| Category | Detail |
|---|---|
| Food Consumption | Estimate and record the menus and amount of food they consumed in restaurant, cafés, and hotels (or accommodation for breakfast). |
| Housing/ Accommodation | Water consumption for laundry and toilet. |
| Transportation | For bus, the types of transportation (the number of seats, the size of engines, the age of vehicles, and fuel type), the distance travelled and the amount of fuel consumed were recorded. |
| Goods | Record the souvenir and any other items purchased.<br>Also ask shop keepers what type of items were popular among the Japanese travellers. |
| Services/ Activities | Record the services used and activities they carry out. |
| Other | Note any other particular behaviour of the group and other Japanese travellers seen during the trip. |

## 3.4 Japanese Waitomo Full-Day Tour

The Waitomo Caves are one of the most popular tourism destinations in New Zealand and it is no exception for the Japanese travellers. I joined a full-day tour organised by Scenic Pacific Tour New Zealand Ltd. on Sunday 21 August 2005 (Waitomo Express –Tour Code: 7J). This tour departs daily and is particularly designed for Japanese travellers. The tour includes all 'must-see' destinations/activities for the Japanese travellers in Waitomo Region. The tour departed from Auckland (picked-up the tourists from their accommodation) and visited Waitomo Region via Hamilton. Barbeque lunch was also included in the tour. During the tour, I asked several questions of a tour guide, a bus driver, staff in Angora rabbit shearing shed and a chef in a restaurant. I also observed the behaviour of the Japanese travellers in the tour group.

This trip helped clarify the detail of the resources required for the Japanese travellers. Informal interviews with people who knows the Japanese market was particularly useful to find the characteristics and behavioural patterns of Japanese tourists. Unlike the pilot study, the Japanese travellers in this group were not related and did not know each other before the tour.

## 3.5 Escorted and Package tour itinerary

A total of 104 Escorted and Package tour itineraries were collected from eight different wholesalers and retailers that target Japanese tourists in New Zealand (Table 13). These companies were key wholesalers/retailers selling New Zealand travels to Japanese and their tour itineraries were obtainable from their websites. This meant that it was likely for many Japanese Escorted and Package tourists visiting New Zealand to purchase one to their package deals and travelling according to their itineraries. Many of these itineraries included detailed information about their schedules, services, activities, accommodations, meal arrangements, and transportation methods in New Zealand. From these itineraries, I obtained

information about their travel behaviour and the resource consumption pattern of Escorted and Package travellers, which are the main segments of Japanese visitors in New Zealand. The information was applied in the EF calculation in some cases when the survey results were not sufficient enough to cover the resource consumption patterns of Japanese tourists. Similar method was used in the study of Japanese ski tourists by Yamamoto (2000). The majority of tours were available from October 2004 to October 2005 (some until early 2006). Although the majority of itineraries were different, some itineraries had almost identical contents with different length of stay (adding one or more extra free time).

**Table 13 Tour companies (wholesalers and retailers) and their website addresses.**

| Name of Company | No. of itineraries collected | Sources of Information (Website address) |
|---|---|---|
| JAL Sales Co., Ltd. (JALPAC) | 28 | http://www.jal.co.jp/tours/jlpk<br>http://www.etravel.co.jp |
| JTB World Vacations, Inc./ Japan Travel Bureau (Look JTB) | 37 | http://www.jtb.co.jp/kaigai/pkg |
| Kinki Nippon Tourist Co., Ltd. (KNT Holiday) | 15 | http://www.knt.co.jp/holiday/contents<br>http://www.ab-road.net/cgi-bin/asp/knt/tour<br>http://www1.tour.ne.jp |
| Hankyu Express International Co., Ltd. | 13 | http://www.hankyu-travel.com |
| Nippon Express Co., Ltd. (NEC Look World) | 1 | http://www.ab-road.net/cgi-bin/abr/abtour |
| Nippon Travel Agency Co., Ltd. | 1 | http://nta.opendoor.co.jp/web_search/ws_tour_detail |
| Air New Zealand Holiday (Air New Zealand sub.) | 8 | http://www.airnewzealandholidays.jp/packages |
| STA Travel | 1 | http://www.ab-road.net/doc/guide/tour/abroad/kensaku_guide5.html |

## *3.6 Other Literature Sources*

### 3.6.1 International Visitor Survey (IVS) and International Visitor Arrival (IVA)

International Visitor Surveys (IVS) are conducted by the Ministry of Tourism and provide information about international visitors' travel behaviour, such as expenditure, transportation methods, accommodation types, places visited, and attractions/activities, as well as their demographic information and motivation for visiting New Zealand, and their satisfaction. IVS are conducted annually by 5,000 face to face interviews with international travellers. Detailed methodology of IVS is available from http://www.trcnz.govt.nz/Surveys/International+Visitor+Survey/Survey+Methodology.htm (Ministry of Tourism, 2005a).

The survey of International Visitor Arrivals (IVA) is conducted by New Zealand Customs Service and analysed by Statistics New Zealand. IVA is both a census (by collecting arrival and departure cards) and a survey (samples selected out of these arrival and departure cards), so it can provide precise information about the characteristics of the travellers. In addition, IVA provides timely statistics on the number of persons travelling to (and from) New Zealand. More detailed methodology is available from http://www.trcnz.govt.nz/Surveys/International+Visitor+Arrivals/Survey+Methodology.htm (Statistics New Zealand, 2005a).

IVS results from March 2005 and IVA results from October 2005 were used to compare with my survey results to verify the information I obtained. My sample size was small, thus it could be important to see the results are representing the Japanese tourists in New Zealand. In addition, the IVS results for Japanese visitors were compared with the results of overall international visitors to see the uniqueness of Japanese travellers in their travel behaviour.

### 3.6.2 Other Sources

The other studies and data applied to calculate EF in my study as shown in Table14.

**Table 14 References/bibliographies for data applied for calculation of EF.**

| Data Category | Sources |
|---|---|
| Food | EF for food figures from Wackernagel *et al.* (2000) |
| Transport | Becken (2002); Becken & Cavanagh (2003); Ministry of Transport (1995); EECA (1999); CIA (2005); Air New Zealand (2005); and Statistics New Zealand website (built-up land for transport) |
| Housing/ Accommodation | Becken (2000); Becken & Cavanagh (2003); Becken, Frampton, & Simmons (2001); EECA (2000); Aebischer *et al.* (2003); Statistics New Zealand (2004); and Commercial Accommodation Survey (2005a) |
| Land use | Patterson & McDonald (2004) |
| Attractions & Activities | Becken (2001b; 2003b; 2002); and Becken & Simmons (2002) |
| Goods | Souvenir catalogue from internet - Walker's Choice website (http://mall.jtb.co.jp; http://www.gift-land.com/partner /air-travel/list; and http://www.gift-land.com/partner/japantimes); Japan Paper Association website (http://www.jpa.gr.jp/en/about/ann/outlook2.html) for hygienic paper consumption |
| Energy intensity | Energy intensity from Wackernagel *et al.* (2000) |
| Water use | BRANZ (2003); and Carterton District Council website (http://cartertondc.co.nz/water.html) |
| Waste production & Recycle rate | Ministry for the Environment (1997a; 1997) |
| Equivalence Factors and Yield Factors | Wackernagel *et al.* (2000) |

## *3.7 Analysis*

### 3.7.1 Ecological Footprint Analysis (EFA)

EFA was performed using a modified Excel spreadsheet of Redefining Progress, which was downloaded from their website (www.rprogress.org/newprojects/ecolFoot /faq/ef_household_0203.xls). This Excel spreadsheet was originally produced by Mathis Wackernagel, Chad Monfreda, Diana Deumling, and Ritik Dholakia and published in 2003 (the latest version of Version 1.0 which was released in 1997 at the Centre for Sustainability Studies at the Unversidad Anáhuac de Xalapa, Mexico). I redesigned the spreadsheet to suit calculating the EF of tourists since this original spreadsheet was for household consumption. Some adjustments were also made to suit the New Zealand land productivities (Appendix 3). The followings were the explanations of major changes:

- Equivalence and yield factors were modified to take into account the differences in New Zealand land productivity;
- In food category, honey was added as it is one of the popular New Zealand souvenir products, and two columns (garden area use for food and eating out) were deleted as the tourists frequently eat out and do not grow the vegetables in the garden;
- Housing category had some major changes to show six different accommodation types and their energy consumption rates as the average energy consumption rates differ considerably at each accommodation type.
- Sources of electricity generation were altered to take into account the fact that New Zealand relies heavily upon renewable energy sources (hydro, etc.) for the majority of electricity generation;
- Built-up land for transportation was altered to meet New Zealand road network and the transportation usages on the road to calculate the land area shared by Japanese tourists per visit;
- Energy use/ intensity of the transport (energy per passenger kilometre) altered to accommodate New Zealand transportation systems as the original figure was based on the transport energy intensity in the United States. Becken and

Cavanagh (2003), Becken (2002), EECA (1999) and Ministry of Transport (1995) had more accurate figures in New Zealand transport energy intensity;

- In goods category, some goods that are least likely to be purchased by tourists were deleted;
- Entertainment activities/attractions during the travel were added to services categories;
- The recycling rate of national average for New Zealand was applied to calculate the assimilation land for waste produced by the tourists; and
- Unrelated columns were deleted (e.g., monthly resource consumptions, Fulfilment assessments, household consumption that are not relevant while travelling such as house insurance).

This spreadsheet calculates the EF for the Japanese travellers by placing a total amount of each resource consumed by Japanese travellers during their trip in the column ('AMOUNT per trip'). It estimates the EF per tourist trip by dividing by the number of travellers who returned the survey.

To recalculate EF in specific location into global hectares (gha), "equivalence factors" and "yield factors" were used. Equivalent factor indicates potential productivity of the land in particular location (in this case New Zealand) compared with the world average bio-productive land regardless of management practices. On the other hand, yield factor considers existing technology and management practices on top of the productivity of the land. Thus, the EF in global hectares was generally obtained by following formula:

$$EF\ (gha) = Area\ (ha) * Equivalence\ factor\ (gha/ha)$$

While EF of built-up land includes foregone productivity, thus the formula to calculate global hectare is adjusted using the yield factor.

$$EF_{built\text{-}up}\ (gha) = Area_{built\text{-}up}\ (ha) * Equivalence\ factor_{built\text{-}up}\ (gha/ha) * Yield\ factor_{cropland}\ (-).$$

The spreadsheet initially calculated EF for per tourist trip, but gha per tourist per day was recalculated by dividing the individual EF by each traveller's length of stay (in

days). The daily EF was used for comparison among the different segments of travellers, age, gender and the length of stay, as well with the EF of New Zealand (national average per capita per day), Japan (national average per capita per day) and the global average (per person per day). These comparisons would indicate how much more resources and productive land were required by the average Japanese travellers than the residences in the destination areas (New Zealand in this case). It also compares their resource consumption rate with their everyday living. In addition, ecological deficit (or sustainable gap) was assessed by comparing the size of available productive land in New Zealand with the EF of Japanese tourist. The concept of 'ecological deficit' was introduced by Mathis Wackernagel and William Rees as an indicator of unsustainability, and it means that difference between the EF and the available ecological capacity, or productive land.

#### *3.7.1.1 Ecological Footprint of Main Consumption Categories*

In the spreadsheet, the resource consumption was separated into six main consumption categories (food, housing/accommodation, transportation, goods, services/activities, and waste).

##### *3.7.1.1.1 Food*

This calculation included all food consumed and purchased by the Japanese travellers during their New Zealand trip. There were 20 sub-categories (or types of food) within the food consumption category. Most food categories require energy land and cropland, some require pasture to produce, while seafood category require aquatic area. This category did not include the energy required for cooking/chilling as these were calculated in housing/accommodation category.

##### *3.7.1.1.2 Housing/accommodation*

Resources and energy consumed in the accommodation and for meals (in restaurants, café, or any other places) were calculated in this category. Most energy in this section was consumed as electricity. In accommodation sector, electricity was the main source of energy (average 75 % of energy use), followed by coal (12 %), LPG (9 %),

and petroleum fuel (3 %). Natural gas & wood (1%) played only minor role in accommodation sector (Becken *et al.*, 2001). The energy sources varied by the accommodation type (Becken & Cavanagh, 2003), and energy intensity per visitor night also varied at different accommodation types (see Literature Review Chapter). Therefore energy consumption was calculated from the accommodation type in which each traveller stayed. The energy intensity of each accommodation type from Becken *et al.* (2001) and EECA (2000) was applied in the calculation. Once the total electricity consumption was estimated from the survey and other sources, the ratio of electricity sources was applied from the national average electricity generation. In New Zealand, 65.4 % of electricity is generated from hydro, 22.6 % from natural gas, and 6.3 % from geothermal (Statistics New Zealand, 2004). These were important since each source requires different type of productive land; namely hydro-electricity generation requires arable land, with no $CO_2$ emissions and other non-renewable sources such as coal produce a considerable amount of $CO_2$.

The housing/accommodation category was further divided into nine sub-categories. Energy land, forest and built-up land were required for housing. Forest land is for furniture and timber for building and other products used by tourists. Water consumption is included in this category. Built-up land is for the accommodations and other building (e.g., restaurants) establishment. To calculate the built-up land area for accommodation, the average space per bed ($m^2$) for each accommodation type from Becken (2000) was applied to the calculation (hotel = 34 $m^2$, B&B = 34 $m^2$, motel = 13 $m^2$, and BBH = 11 $m^2$).

*3.7.1.1.3 Transportation*

This category includes only domestic transportation (within New Zealand). Although $CO_2$ produced by international flights could have a major impact on global warming, $CO_2$ emissions by international flights were not considered in the analysis since it has global impacts rather than only New Zealand and could not be avoided. Besides, EF might be largely distorted if $CO_2$ emissions international flights were included since these $CO_2$ emissions could be the major part of EF. The results could over-emphases the impacts of $CO_2$ emissions and other resource consumption and waste production might not be seen as important. There were nine different transportation methods in the spreadsheet and all road transportation required both

energy land and built-up land for road they travel. Built-up land required by Japanese tourists were estimated from the area covered by the sealed road in New Zealand (obtained from Statistics New Zealand website) divided by the total vehicle kilometres (vkm) travelled per year in New Zealand in 2000 (obtained from Ministry of Transport and Statistics New Zealand website), then multiplied with the distance travelled by Japanese tourists. Approximately 10 % of these total vkm are heavy commercial vehicles (Ministry of Transport, 1995), thus I assumed that 10% of these heavy commercial vehicle were buses. i.e., one percent of the total kilometres are by bus.

*3.7.1.1.4 Goods*

This section included any items consumed or purchased by those Japanese travellers in New Zealand (mainly souvenirs). The spreadsheet included 10 different types of goods under this category. Five different productive lands were required for good depending on the nature of products.

*3.7.1.1.5 Service/activities*

For all the services (including the postage, laundry, and telephone calls) and their activities during the trip were calculated in this section. 29 different activities and services were included into this category. All of them need both energy and built-up land and energy requirement varies among those services and activities.

*3.7.1.1.6 Waste*

There are no available data about the amount of waste generated by tourists during the trip; hence the amount of waste was assumed to be the same as the ordinary New Zealander. The amount of New Zealand average waste generation was applied in the calculation. Five different types of waste were included here, but food scraps were not included in this category as it was calculated in food consumption category. All waste types require both energy and built-up land for landfill (or land to assimilate the waste). Forest was required for paper and paperboard. The size of productive lands for waste would be reduced if the waste was recycled.

### *3.7.1.2 Ecological Footprint for Land Type*

#### *3.7.1.2.1 Energy land*

An average forest of temperate, boreal and tropical area can accumulate approx. 1.05 tonnes of carbon per ha per year, while young to middle aged forests can assimilate $CO_2$ at the fastest rate over 50 - 80 year time span. In New Zealand, the absorption rate is faster and an average ha of *Pinus radiata* can absorbs 3.6 tonnes of carbon (Hollinger, MacLaren, Beets, & Turland, 1993). Nevertheless this figure may vary considerably between regions depending on plantation age, soil type, and climatic conditions. Fossil energy footprint was calculated from the amount of products consumed (kg) multiplying with energy intensity (MJ/kg) and carbon sequestration ratio ($m^2$/MJ).

#### *3.7.1.2.2 Cropland (or arable land)*

The size of cropland was calculated from the quantity consumed (kg) multiplied with footprint intensity (global $m^2$/kg for primary product) and conversion factor from primary to secondary products (kg primary product/kg secondary product). This conversion factor was because the quantity of secondary product (e.g., bread) is not same as the amount of primary product required (e.g., wheat).

#### *3.7.1.2.3 Pasture*

The formulas for pasture land component of EF are generally same as the ones for cropland (only differ in productivity).

#### *3.7.1.2.4 Built-up land*

The same equivalence and yield factors as cropland were applied in built-up land.

#### *3.7.1.2.5 Forest*

To estimate the EF for timber, the world average productivity of timber is estimated to

be approx. 1.99 $m^3$/ha/yr for round wood (Wackernagel's estimate based on FAO report), with a waste factor for firewood equal to 0.53 because its productivity is considered to be twice that of round wood (Cole, 2000). That is, one ha of forest can produce approx. 3.8 $m^3$ of firewood per year. To calculate water footprint, the following theory was applied. In humid areas, forests can generate, in wells and springs about 1,500 $m^3$ of fresh water per ha/year with a rainfall of 15,000 $m^3$/ha/year (Wackernagel, Monfreda, Deumling, & Dholakia, 2003). Water production may be the secondary function of forest use; however, the water production of the forest area was added to the footprint in that case. Both plantation and natural forests could be counted.

*3.7.1.2.6 Fisheries*

This study included the aquatic area only for food consumption. Although some non-edible items could be consumed for other purposed (e.g., paua shell for souvenir or accessory), it was not considered here. This was because many souvenir products sold in New Zealand (especially ornamental products) are made in other countries such as China.

### *3.7.1.3 Categorization of travellers*

Travellers were grouped into different categories according to their travel styles and purpose of visit. The purposes of the visit categories were holiday, business, visiting friend and relatives (VFR), education, and others (including school excursion). The travel styles were escorted package traveller ('Escorted' hereafter), package tourist without escort (Package), semi-independent traveller (SIT) and full-independent traveller (FIT) (Table 15 for detailed definitions). Most of the definitions for travel style are same as the ones used by TRCNZ (except Escorted traveller). Furthermore the age and gender of travellers were used as groups to compare their EF.

These categorisation (or segmentation) may be able to identify the particular behaviour of tourists which lead to high resource consumption as these factors may influence the behaviour and travel patterns of tourists. Once the travellers were categorised, their EF size were compared to identify any differences and characteristic of consumption pattern in each segment of travellers.

**Table 15 Definitions for each travel styles.**

| Travel Style | Definitions |
|---|---|
| Escorted package traveller (Escorted) | A package traveller paid for a various items before travel as part of a package. These items include international airfares, accommodation, domestic airfares or other transport, meals and sight seeing/ activities/ attractions. The different companies offer very similar itineraries that usually include a variety of 'must-do' activities and destinations. |
| Package traveller without escort (Package) | The itinerary includes the international flights and accommodation, but usually does not include many activities, transport and meals within New Zealand. |
| Semi-Independent Traveller (SIT) | SITs must have paid for their international airfares before arriving in New Zealand as well as at least one of the following items: domestic transportation, accommodation, meals, and activities. |
| Full-Independent Traveller (FIT) | FITs must not have purchased their domestic airfares, accommodation, meals, other transport, some sightseeing/ activities/ attractions/ other entertainment, or other major activities before arriving in New Zealand. They arrange their trip while they are in New Zealand. |

### 3.7.2 Multivariate Statistical Analysis

Multivariate statistical analysis was performed using Weka (machine leaning/data mining software in Java, which can create, run, modify, and analyse experiment). It is available from http://www.cs.waikato.ac.nz/~ml/weka/. Classification trees in Weka 3.4 were used in this study to predict the various attributes of each Japanese tourist and their size of EF. Purpose of visit, travel style, length of stay, age, and gender of each traveller were tested to see which category best predicted their EFs. If the behaviour can be accurately predicted, then the causes of that behaviour that results in large EF would be identified, which could help finding solutions to reduce resource consumption rate. The results from Weka were visually presented to highlight the variables predicting EFs.

The results of classification trees were evaluated by cross-validation and Kappa statistics. Kappa is the proportion of agreement after chance agreement has been excluded and measures how the predictions would work on new data, i.e., data is not used to build model independent or test data. Cross-validation is removing a portion of the data, building the model without out it, then testing with the held-out data. It used 10-fold cross-validation when 10 % of the data was held out 10 times so that 10 models were built and tested each time with the held out 10% of the data.

### 3.7.3 Ordination plot

The individual EFs (by main consumption categories and the land types) were examined using non-metric multidimensional scaling (NMS) in the Multivariate Analysis software, PC-ORD Version 2.0. NMS was employed to examine any similarity in resource consumption patterns among the travellers with same purpose of visit or travel style. This analysis could demonstrate if travel purpose and styles have any influences on the behaviour and resource requirement. The graphical output of ordination could indicate any similarity/ dissimilarity by distance on k dimensions (axes) of the ordination space. This process gives a visual representation of the similarity in a multivariate sense of a number of samples. Thus clustering into groups

shows similarity while groups spread throughout ordination space indicates no pattern of similarity between groups.

### 3.7.4 Statistical Analysis

The size of EF for each segment was statistically analysed using t-test and regression analysis to examine any significant differences among different segments, length of stay, gender, and age group, and also each consumption category and land type within the individual EF. This analysis would also help identifying the causes of particular behaviour that results in larger EF. Each purpose of visit (Holiday, Business, VFR, Education and Other), travel style (Escorted, Package, SIT and FIT), and gender of travellers were statistically compared with one another using t-test (two-sample assuming unequal variances). EF of each main consumption category and land type by purpose of visit and travel style was also analysed using t-test.

Regression Analysis was employed to reveal the relationship between the EF and the length of stay and age group. This analysis helps to understand how length of stay and age group would affect the EF of each traveller and to see if there would be any trends of EF increase or decrease with their length of stay or age progress.

### 3.7.5 Comparisons of Ecological Footprints

The daily EFs of the Japanese travellers were compared with:

- Available bioproductivity in New Zealand and the world to calculate the ecological deficit as a measure of ecological unsustainability; and
- Average resident's EFs of New Zealand, Japan, and world to examine whether Japanese travellers require more resources than the residents in the destination (New Zealand), or compared to their own EF when they were not travelling. If there were any difference, these comparisons could discover how much more and what causes such resource consumption pattern by the Japanese tourists.

The component of EF (by each land type and consumption category) was also compared for close examination. This was to see what land type the Japanese travellers actually require, i.e., the specific type of their environmental impacts, and the causes of the impacts (from consumption category). Resident EF and bioproductivity was obtained from Loh and Wackernagel (2004) since their publication was the latest available and included EFs of many countries with the detailed components of EFs. The detail of footprint in each consumption category in New Zealand was available from New Zealand Ministry for the Environment website. It was assumed that the calculations performed for each EF was similar; therefore these simple comparisons would be useful.

Resource consumption pattern of Japanese tourists were compared with other tourists (using IVS and other studies) to see how unique Japanese tourists are and if they seem to require more resource than tourists from other countries.

## *3.8 Limitations of This Research*

There were several limitations for this research.

- Time constraint: I completed the thesis in 15 months (from Nov 2004 to February 2006), thus I missed the most popular tourism season in New Zealand (November to March) for the survey opportunity.
- Resource limitation: since the research budget was limited, the size of survey was relatively small (less than 300). The international reply envelope was prepared so the Japanese travellers could reply even from Japan. However, the international reply envelop would cost over twice the domestic postage.
- The survey delivering period (July 2005) overlapped with the Air New Zealand strike and several flights to Japan were cancelled which reduced the number of passengers at the check-in counters. Thus the five-day delivery period was not long enough to deliver as many questionnaires as planned (the initial plan was to deliver at least 300 questionnaires).
- I had to make many assumptions about resource consumption, energy requirement, and waste production. In theory, EFA could include every resource for entire processing and transportations, however, it is practically impossible to collect such a complete data set for every item we consumed. Thus I simplified the some of resources consumption and the waste generation.
- For this EFA, I excluded many resources consumed by Japanese travellers when those resources were produced outside of New Zealand (e.g., transport from their home to airport in Japan). Although it would be still unsustainable if there were huge costs and impacts in other countries while there are not much impacts in New Zealand, this was because I focused on the impacts of Japanese travellers within New Zealand.
- Waste generation was not specific to the Japanese tourists, since it is difficult to find the information about how much waste they generate during the trip.
- This EFA gives an estimation of the land required or "general land requirement" not the absolute land area requirement as there are many assumptions such as using only general numbers or consumption rates.

# CHAPTER FOUR:

# *RESULTS*

## *4.1 Survey*

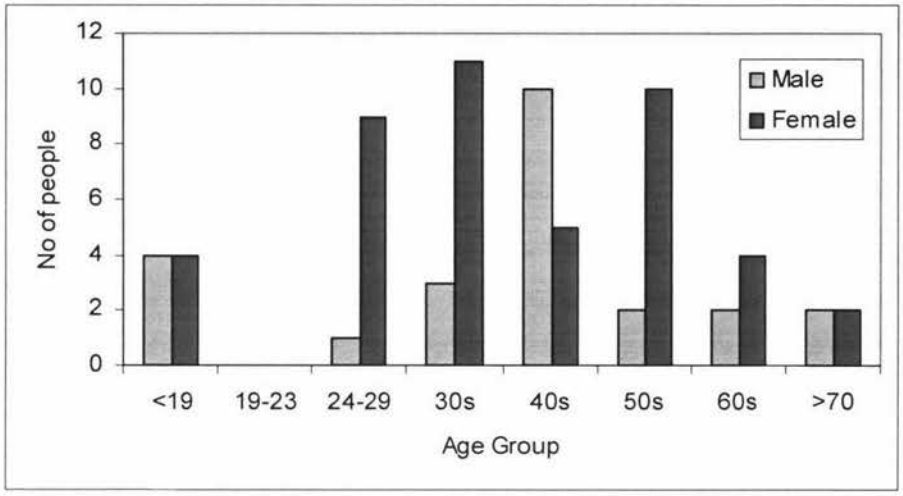
Of the 262 questionnaires delivered, 70 people replied, which gave the reply rate of 25.7 %. At the group check-in counter, five tour groups agreed to participate in the survey. This included one junior high school excursion (a total of 76 travellers including teachers).

### 4.1.1 Background of Travellers

#### *4.1.1.1 Gender and Age group*

There were 24 males and 45 females (one person with unknown gender and age). Overall, the travellers in their 40s were the largest age group (15 people or 21 % of survey replied), followed by those in their 30s (20 %). The largest age group for male travellers was those in their 40s (42 % of the male travellers). Although the age distribution for female travellers were more widely spread, there was a relatively smaller proportion of female travellers in their 40s (11 % of the female travellers), and there were more female travellers in the 30s (24 %) and 50s (22 %) or even late 20s (20 %) (Fig. 9) There were no travellers aged between 19 and 23 (most likely tertiary students), probably because the survey was not conducted during the university holiday season when the students were most likely to leave New Zealand.

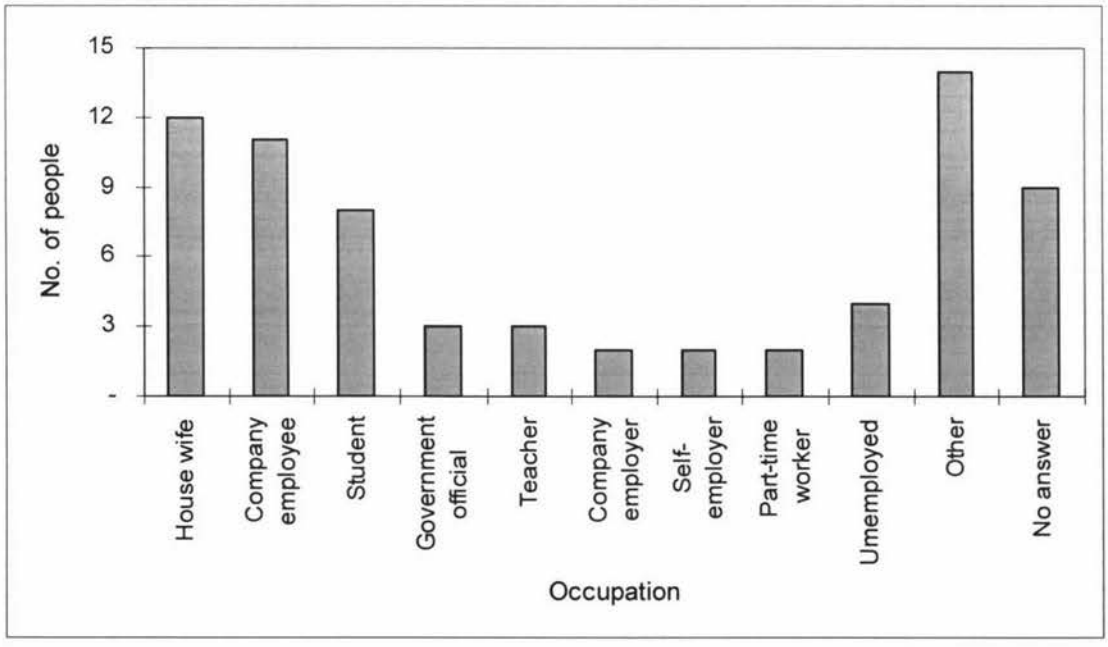
**Fig. 9 Frequency distribution of age group and gender, from the survey conducted in July 2005 (n = 69).**




### *4.1.1.2 Occupation*

The most common occupations of the Japanese travellers were housewives (17 % of the survey replied), followed by company employees (16 %) and students (11 %) (Fig. 10).

**Fig. 10 Occupations of the Japanese travelers, from the survey conducted in July 2005 (n = 69).**

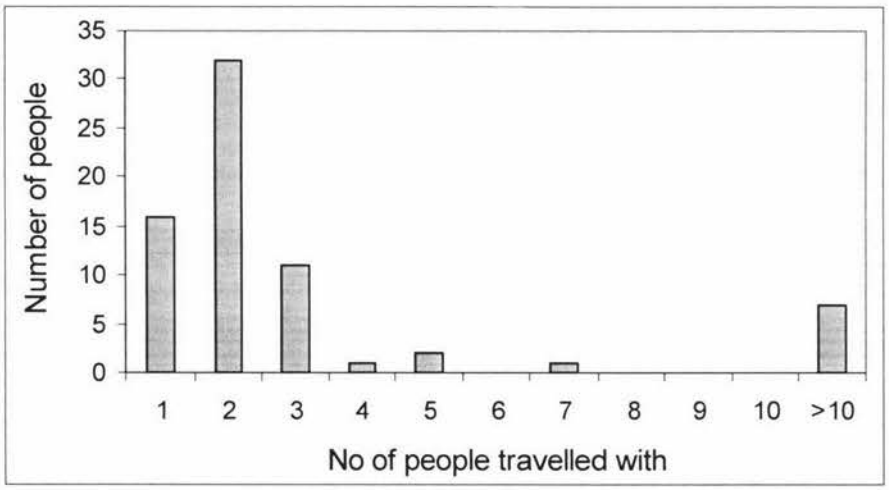


### 4.1.2 Size of Groups

The majority of Japanese travellers visited New Zealand accompanied by another person (friend, family or spouse). The average size of the group was 8.8 people while the median was two people (Fig. 11). The average was skewed largely by one large group of a school excursion (six of 76 people replied to the survey).

The majority (80 %) of the travellers shared a room with someone else, but this number included backpackers who stayed in dormitory rooms while travelling alone. 19 % of travellers stayed in the room by themselves (one person did not answer).

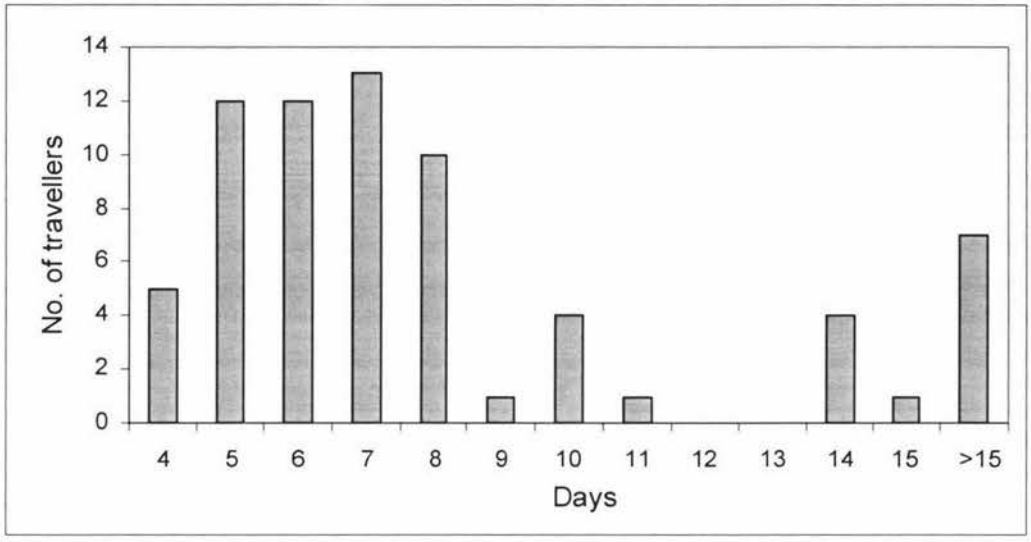
**Fig. 11 Frequency distribution of the number of people travelled with, from the survey conducted in July 2005 (n = 69).**




### 4.1.3 Length of Stay

The average length of stay was 16.2 days and the median was seven days. The average was skewed mainly by three visitors who stayed New Zealand for over three months (110 days for education, 180 days for business, and 300 days for working holiday purposes). Although the average length of stay was 16 days, 60 % of the travellers stayed in New Zealand for less than a week, and 74 % of the travellers stayed for less than eight days (Fig. 12).

**Fig. 12 The frequency distribution of length of stay from the survey results, conducted in July 2005 (n = 70).**




### 4.1.4 Purpose of Visit and Travel Style

About half of the Japanese travellers visited New Zealand for a holiday. The other reasons were almost equal in number (ranging from 9 % to 16 %). Escorted travellers were the predominant style among the Japanese travellers in New Zealand as 40 % of the survey replied was escorted travellers (Table 16). As shown in other studies, Semi-Independent Traveller (SIT) and Full-Independent Traveller (FIT) were recently growing segments, while these segments were 26 % and 19 % of the survey replied respectively. Package travellers were the smallest of all travel styles in this study (16 %). Most holiday travellers were either escorted or package travellers while travellers for other purposes were mainly SITs or FITs. Business travellers were more likely to be FITs and Visiting Friend and Relatives (VFR) and education travellers were visiting New Zealand as SITs.

**Table 16 The purpose of visit and travel style, from the survey conducted in July 2005 (n = 70).**

| | Holiday | Business | VFR | Education | Other | Total |
|---|---|---|---|---|---|---|
| Escorted | 22 | 0 | 0 | 0 | 6 | 28 |
| Package | 9 | 0 | 2 | 0 | 0 | 11 |
| SIT | 2 | 3 | 7 | 4 | 2 | 18 |
| FIT | 2 | 6 | 2 | 2 | 1 | 13 |
| Total | 35 | 9 | 11 | 6 | 9 | 70 |

#### *4.1.4.1 Purpose of Visit*

Of the Japanese females who travel to New Zealand, 51 % do so for holiday purposes and 20 % for VFR. The female travellers were least likely to visit New Zealand for business purposes (only seven % of the females were here for business). The male travellers were mainly here for holiday (50 %) or business (25 %). Only eight % of the male travellers visited here for VFR, and no males were here for education (Fig. 13).

The age distribution by purpose of visit showed that the education travellers were relatively younger than other segments (median was 24 – 29 year age group), and VFR travellers were older (median age group was in 40s while the 36 % was in 50s) (Fig. 14). Holiday travellers were relatively widely distributed with a peak in the 40s (26 % of all holiday travellers). The main age group for business travellers were those in their 30s (56 % of all business travellers).

The average length of stay was the shortest for holiday travellers (Table 17). None of holiday travellers stayed in New Zealand for over two weeks. The VFR travellers also did not stay long in New Zealand. The longest length of stay for VFR travellers was 14 days. Business, education and other purpose travellers stayed longer in terms of the average length of stay. The median showed that the length of stay for business travellers was same as VFR travellers and the education travellers stayed for the longest.

**Fig. 13 Purpose of visit by gender from the survey results, conducted in July 2005 (n = 69: 24 male and 45 female).**

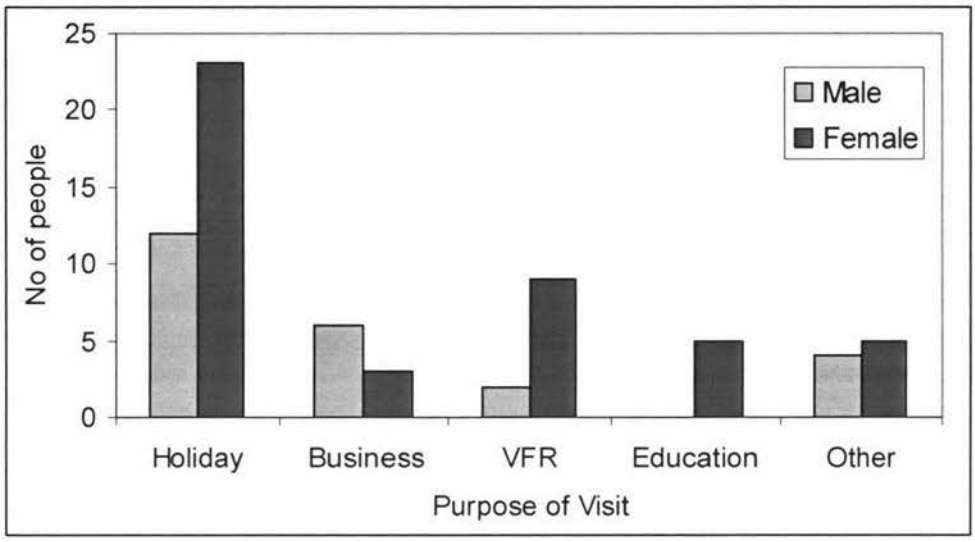



**Fig. 14 The travel purpose by the age group, from the survey conducted in July 2005 (n = 69).**

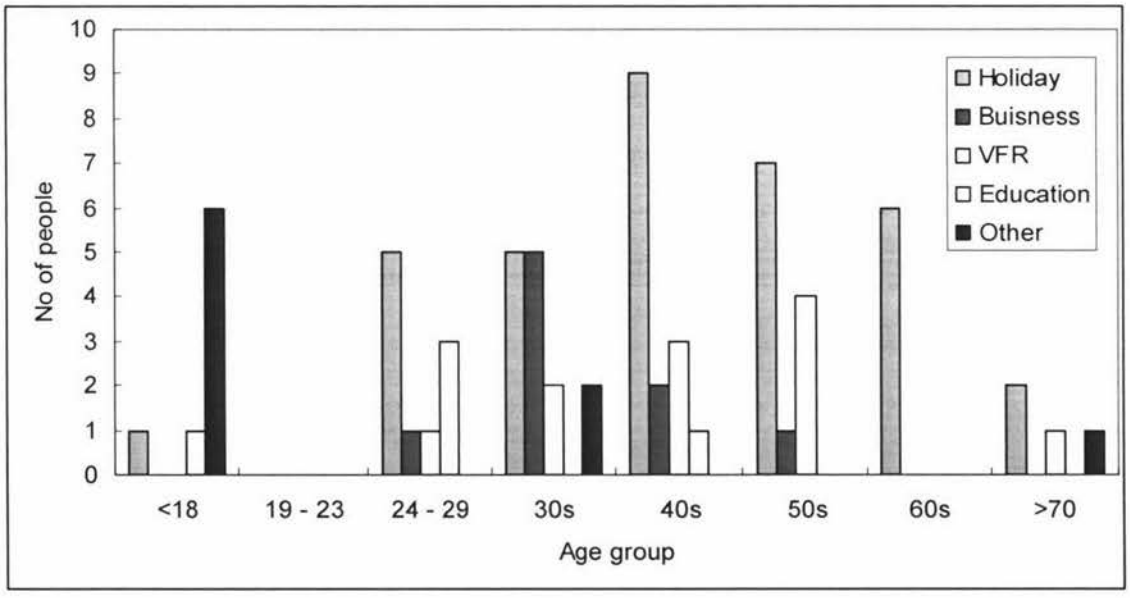



**Table 17 Average and median for length of stay by travel purpose, from the survey conducted in July 2005 (n = 70).**

| | Holiday | Business | VFR | Education | Other | Overall |
|---|---|---|---|---|---|---|
| Average | 6 | 31 | 10 | 27 | 39 | 16 |
| Median | 7 | 8 | 8 | 15 | 6 | 7 |

### *4.1.4.2 Travel Style*

For male travellers, escorted travellers were the most common (50 % of the male travellers) and only eight % of males were on package tours (Fig. 15). SITs and FITs were equally common among the male travellers (21 % each). For female travellers, escorted travellers were also the most common (36 % of the female travellers) and 20 % were Package travellers. The second largest travel style for females was SIT, but FIT was the least likely travel style for females travellers.

Escorted travellers were common among the younger (<18 years old) and middle to older (in 40s to 60s) segments of the traveller. SITs were common in all age groups, while FITs were mainly in their 30s (75 % of all FITs were in their 30s) (Fig. 16).

The length of stay showed that escorted and package travellers stayed for a similar length of time and both were shorter than SITs and FITs. There were no escorted or package travellers who stayed for more than seven days. FITs stayed for the longest in both average and median (Table 18).

**Fig. 15 Travel Style by gender from the survey results, conducted in July 2005 (n = 69: 24 male and 45 female).**

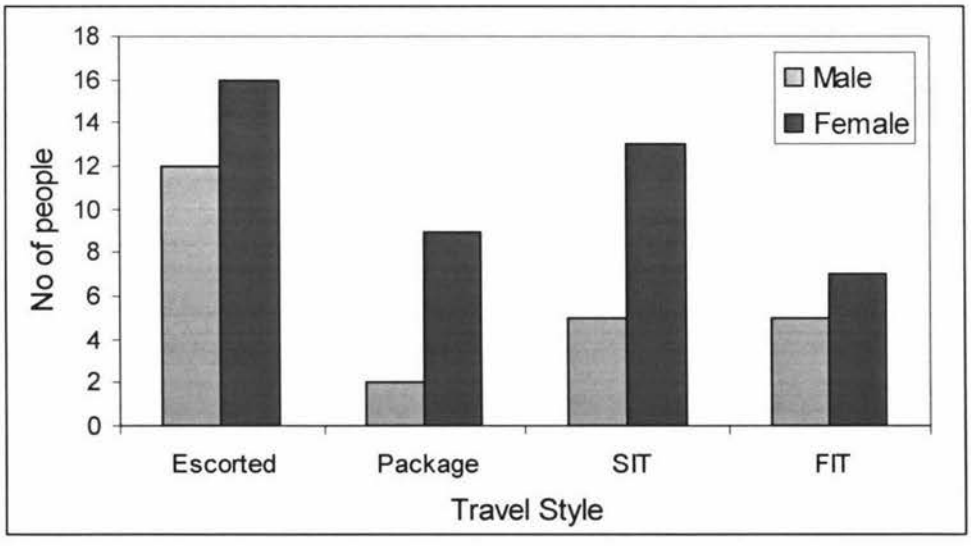


**Fig. 16 The age distribution of the Japanese travellers by the travel style, from the survey conducted in July 2005 (n = 70).**

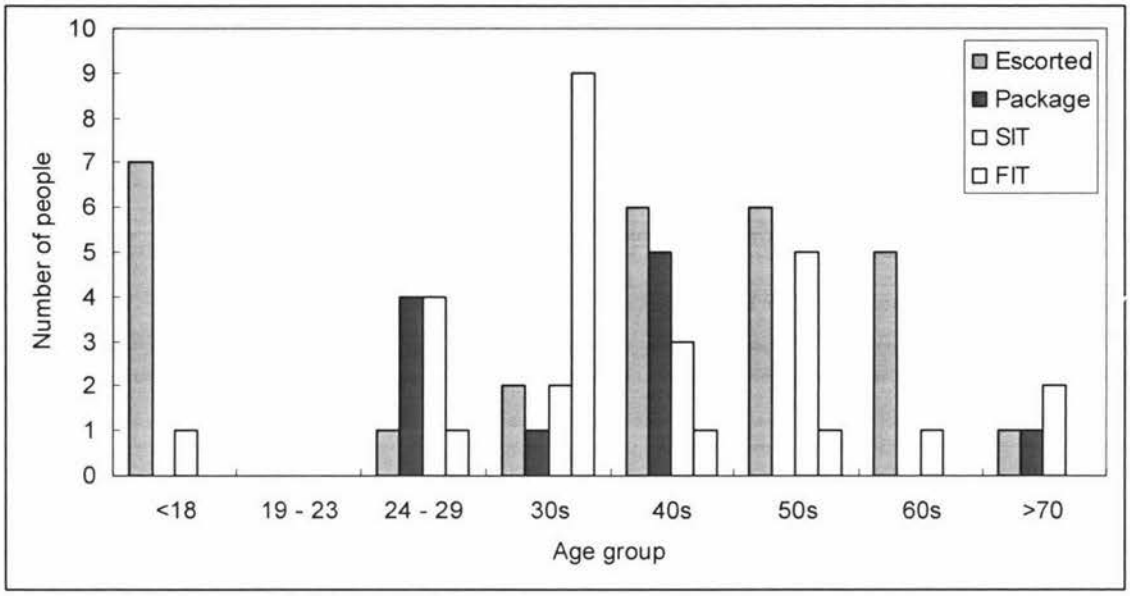



**Table 18 Average and median for length of stay by travel style, from the survey conducted in July 2005 (n = 70).**

| | Escorted | Package | SIT | FIT |
|---|---|---|---|---|
| Average | 6 | 6 | 15 | 49 |
| Median | 6 | 6 | 8 | 14 |

### 4.1.5 Travel Destinations

The most popular destination was Auckland, followed by Christchurch, Mount Cook, Waitomo, Rotorua, and Tekapo. On average, a traveller visited 4.7 places (SD = 3.67, median = 4) during their New Zealand trip (Table 19).

There were some trends among the travellers with different purposes of visit. Holiday travellers usually visited only major tourism destinations. Business travellers also visited many famous places as tourism destinations, but they also visited other places which were not popular among the Japanese travellers. Some VFR travellers visited places not particularly known as tourism destinations (presumably to see their friends and relatives, e.g., Hamilton, Taranaki, Manawatu, Bay of Plenty).

**Table 19 The total number and percentage of visit by the destinations, from the survey conducted in July 2005 (n = 70).**

| Name of place | No | % |
|---|---|---|
| Auckland | 61 | 87% |
| Christchurch | 37 | 53% |
| Mt Cook | 32 | 46% |
| Waitomo | 28 | 40% |
| Rotorua | 24 | 34% |
| Tekapo | 23 | 33% |
| Queenstown | 17 | 24% |
| Milford Sound | 11 | 16% |
| Wellington | 10 | 14% |
| Taupo | 9 | 13% |
| Wanaka | 8 | 11% |
| Coromandel Peninsula | 6 | 9% |
| Te Anau | 6 | 9% |
| Bay of Island | 5 | 7% |
| Arthur's Pass | 5 | 7% |
| Fox Glacier | 5 | 7% |
| Napier | 4 | 6% |
| Cape Leinga | 3 | 4% |
| Picton | 3 | 4% |
| Nelson | 3 | 4% |
| Kaikoura | 3 | 4% |
| Hammer Springs | 3 | 4% |
| Franz Josef Glacier | 3 | 4% |
| Great Barrier Is | 2 | 3% |
| Tauranga | 2 | 3% |
| Taranaki | 2 | 3% |
| Manawatu | 2 | 3% |
| Westport | 2 | 3% |
| Greymouth | 2 | 3% |
| Dunedin | 2 | 3% |
| Hamilton | 1 | 1% |
| East Cape | 1 | 1% |
| Gisborne | 1 | 1% |
| Invercargil | 1 | 1% |

### 4.1.6 Transportation methods

In terms of the number of travellers, domestic flights were the most frequently used transportation methods (67 %), followed by large buses with over 30 seats (59 %).

Purpose of visit seemed to influence the preference of travel methods. A large proportion of holiday travellers used domestic flights and coaches (82 % and 77 % respectively) (Fig. 17). However, holiday travellers were less likely to drive a car or use smaller buses (14 – 29 seats) and ferries. Business travellers used mainly domestic flights, vans, cars or public buses, and did not use large buses, taxi/shuttles, trains and ferries frequently. Trains were used only by holiday and education travellers. VFR travellers used cars more than any other segments, but they also used domestic flights, vans and taxi/shuttles.

Although all travel styles frequently used domestic flights, Escorted tourists used domestic flights and large buses (93 %). The majority of package travellers also used large buses frequently (72 %) but they also used vans, taxi/shuttles and public buses. SITs were the most frequent user of cars. FITs were the least frequent users of large buses but they used vans, cars or public buses (Fig. 18).

**Fig. 17 Transportation methods by purpose of visit, from the survey conducted in July 2005 (n = 70).**

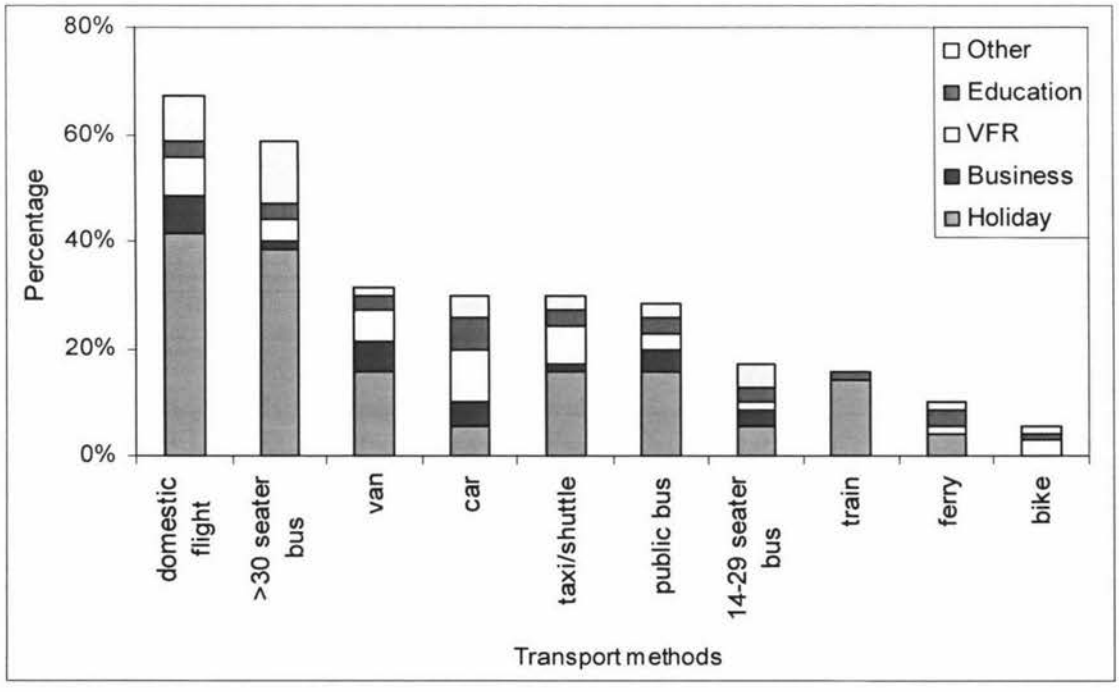
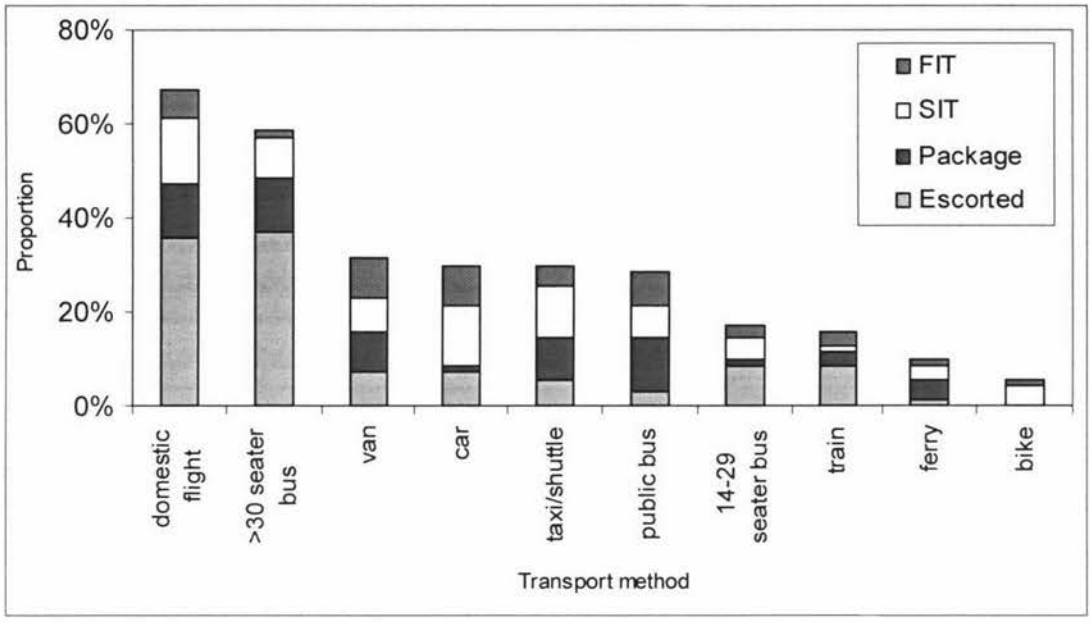


**Fig. 18 Transportation methods by travel style, from the survey conducted in July 2005 (n = 70).**




### 4.1.7 Shopping behaviour

The most popular consumer products for Japanese travellers were in the cosmetics/ soap/ hand-cream category followed by the medicine/health supplement category. Cotton products (mainly t-shirts) were also popular items (Table 20).

Business travellers did not buy as many products as other segments, while the holiday makers bought the largest amount. The popular products for business travellers were different from other segments. Honey and medicine/ health supplements were the most popular items for business travellers, and they did not buy cosmetics/ soap/ hand-cream which were the most popular items for others (Table 21).

**Table 20 The number of souvenir items purchased by the Japanese travellers, from the survey conducted in July 2005 (n = 70).**

| Categories | Total No. | Average No. per traveller | Standard Deviation |
|---|---|---|---|
| Cosmetics, soap, hand-cream | 176 | 2.5 | 3.8 |
| Medicine, health supplement | 108 | 1.5 | 3.5 |
| Cotton products | 78 | 1.1 | 2.2 |
| Accessory | 62 | 0.9 | 1.8 |
| Wool, leather products | 49 | 0.7 | 1.3 |
| Wooden products | 14 | 0.2 | 0.8 |
| Honey | 39 | 0.6 | 1.8 |
| Wine | 26 | 0.4 | 1.3 |
| Cookies | 25 | 0.4 | 1.7 |
| Cheese | 24 | 0.3 | 2.4 |
| Chocolate | 23 | 0.3 | 1.8 |
| Candle | 10 | 0.1 | 1.2 |
| Snack | 9 | 0.1 | 0.7 |
| Tea | 4 | 0.1 | 0.4 |
| Butter | 3 | 0 | 0.3 |
| Other | 127 | 1.8 | 5.7 |

**Table 21 Shopping behaviour by purpose of visit, from the survey conducted in July 2005 (n = 70).**

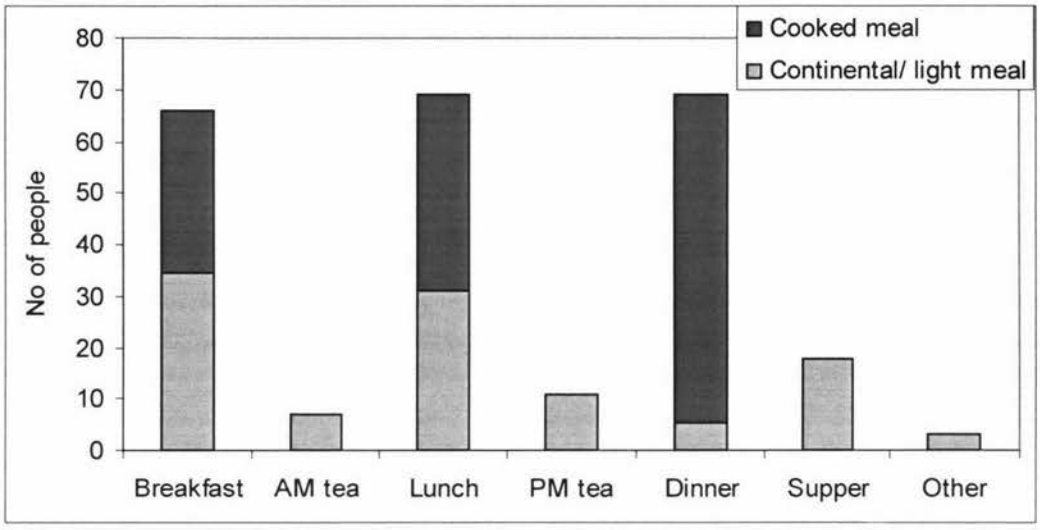
| | Average amount per person | | | |
|---|---|---|---|---|
| Goods | Holiday (n = 35) | Business (n = 9) | VFR (n = 11) | Education (n = 6) |
| Cosmetics, soap, hand cream | 3.4 | 0.0 | 3.3 | 2.2 |
| Medicine, supplement | 2.2 | 1.7 | 0.5 | 1.5 |
| Cotton products | 1.3 | 0.1 | 1.9 | 2.3 |
| Jewelry, accessory | 0.5 | 0.3 | 0.5 | 1.8 |
| Honey | 0.1 | 2.0 | 1.0 | 0.0 |
| Wool, leather products | 1.0 | 0.4 | 1.1 | 0.0 |
| Wine | 0.3 | 0.2 | 0.8 | 0.0 |
| Wooden products | 0.2 | 0.0 | 0.4 | 0.7 |
| Cookie | 0.1 | 0.0 | 1.0 | 0.0 |
| Cheese | 1.0 | 0.0 | 0.0 | 0.0 |
| Chocolate | 0.0 | 0.0 | 0.9 | 0.0 |
| Snack | 0.0 | 0.0 | 0.1 | 0.8 |
| Candle | 0.0 | 0.0 | 0.9 | 0.0 |
| Tea | 0.0 | 0.0 | 0.4 | 0.0 |
| Butter | 0.0 | 0.0 | 0.0 | 0.0 |
| Other | 4.0 | 0.0 | 0.9 | 2.5 |
| Total | 14.1 | 4.8 | 13.5 | 11.8 |

### 4.1.8 Meals

The majority (94 %) of Japanese travellers had meals three times a day. Ten percent had morning tea, 16 % had afternoon tea, and 26 % of the travellers had supper after dinner. The proportion of the Japanese travellers who ate continental breakfast and cold/light lunch were about 50 %, but majority (91 %) of the Japanese travellers ate cooked dinner during the trip (Fig. 19).

For the different travel styles, escorted travellers tended to eat warm/cooked meals. The majority (80 %) of escorted travellers ate cooked breakfast and 82 % had cooked lunch.

**Fig. 19 Meal/snack consumption behaviour of Japanese travelers, from the survey conducted in July 2005 (n = 70).**




### 4.1.9 Accommodation

According to the number of guest nights, flats/rented houses were the most frequently used accommodation type. However, not many Japanese travellers actually stayed in flats measured by the number of travellers. This figure was due to only two travellers who stayed in flats for a considerable period of time (over six months). Thus the number of guest nights was biased. Most Japanese travellers (80 %) stayed in hotels at least one night, thus hotel was the most frequently used accommodation by the Japanese travellers. The second commonest accommodation type was motels/motor-inn (12 travellers) followed by home-stay (11 travellers), BBH/YHA (seven travellers) and private home (six travellers).

For the 'purpose of visit' category, holiday travellers mainly stayed in hotels with only a few staying in BBH/YHA and occasionally motels. Almost all of holiday travellers stayed in hotels at least one night, and only one traveller did not stay in hotel at all. Most (78 %) business travellers stayed in hotels at least three nights and four of them stayed exclusively in hotels. Five of the VFR travellers stayed in private homes (presumably houses of their friends/relatives). They also frequently stayed in hotels and motel/motor-inns. Most education travellers (67 %) stayed in home-stays, but one stayed in BBH/YHA and two in hotels (Fig. 20).

There were noticeable patterns of accommodation type by the different travel styles. Both escorted and package travellers stayed only in hotels except the school excursion visitors who stay in both hotels and home-stays. The accommodation types used by other segments were varied but with a few certain characteristics. Accommodation types of SITs and FITs were more diverse. However, SITs stayed in home-stays commonly and FITs stayed longer in flats and BBH/YHA. Nonetheless, two FITs stayed in New Zealand for over six months and had stayed in flats, which biased the result (Fig. 21).

**Fig. 20 Accommodation type and guest nights by purpose of stay, from the survey conducted in July 2005 (a total of 1131 guest nights).**

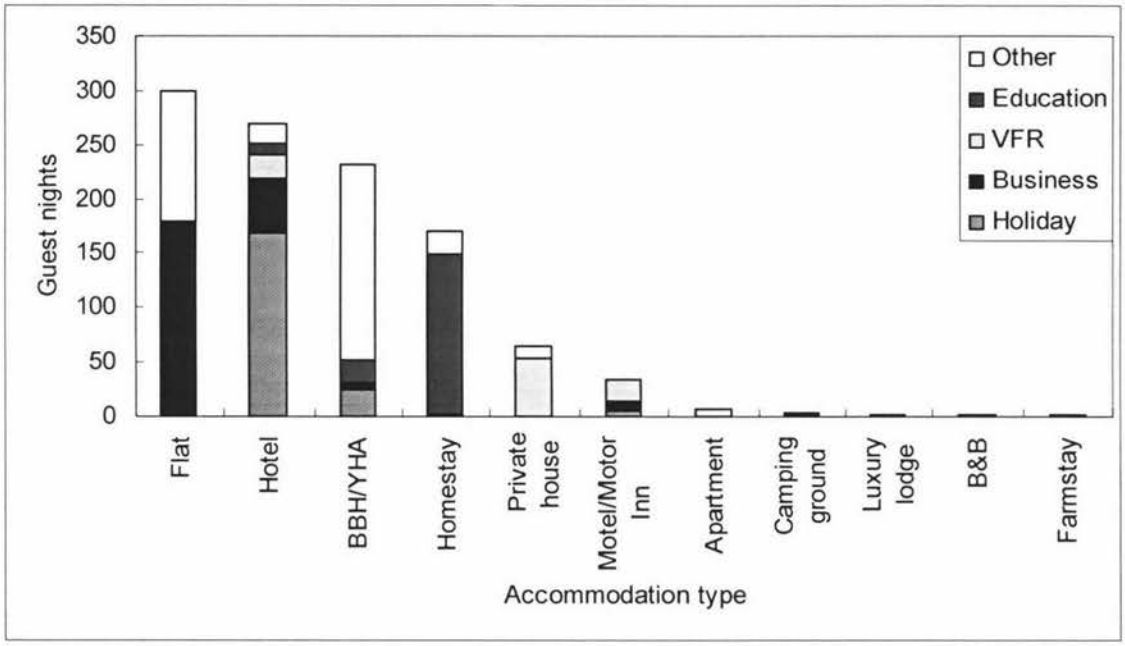
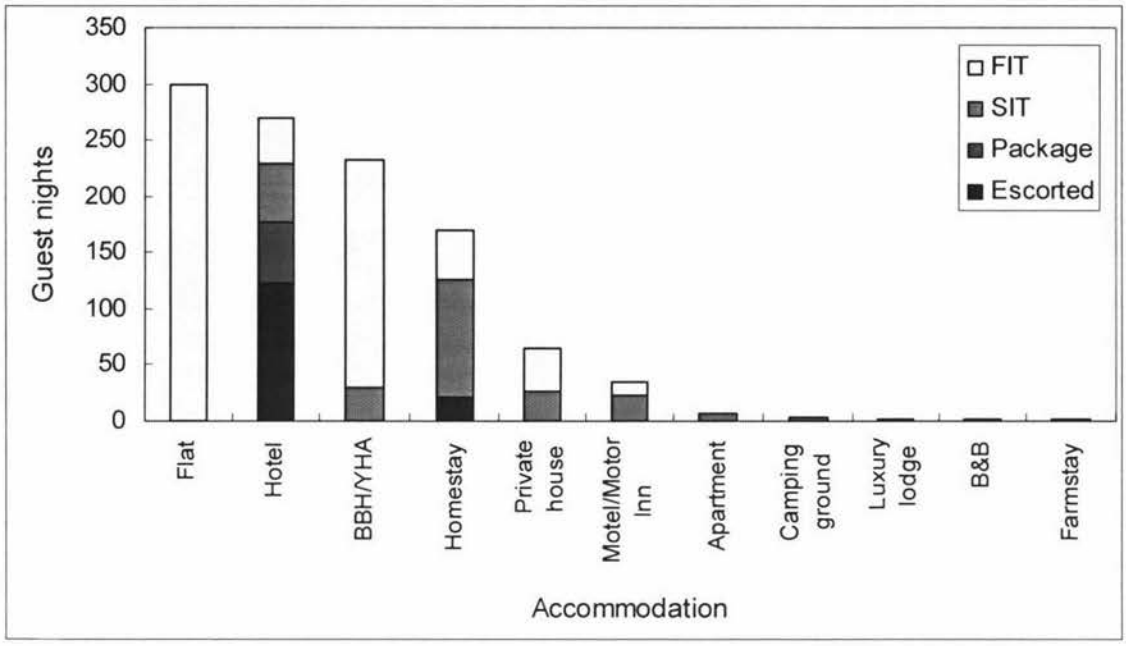


**Fig. 21 Accommodation types and guest nights by travel style, from the survey conducted in July 2005 (a total of 1131 guest nights).**



## *4.2 Comparison of Survey Results with International Visitor Survey (IVS) and International Visitor Arrival (IVA)*

### 4.2.1 General IVS/IVA Results in 2005

According to IVS March 2005, 154,379 Japanese people visited New Zealand during the year ended March 2005, with 63 % of them for holidays, followed by education (13 %) and VFR (10 %). Their main destinations (by the number of visitor nights) were Auckland (40 %), Christchurch (16 %), Queenstown (5 %), Rotorua (3 %), and Wellington (2 %).

The latest information about Japanese arrival was available from IVA and 159,528 Japanese arrived in the year ended October 2005. The monthly arrival showed that 10,728 Japanese arrived in New Zealand in July 2005 (the month I conducted the survey).

### 4.2.2 Comparisons of the Survey with IVS/IVA Results

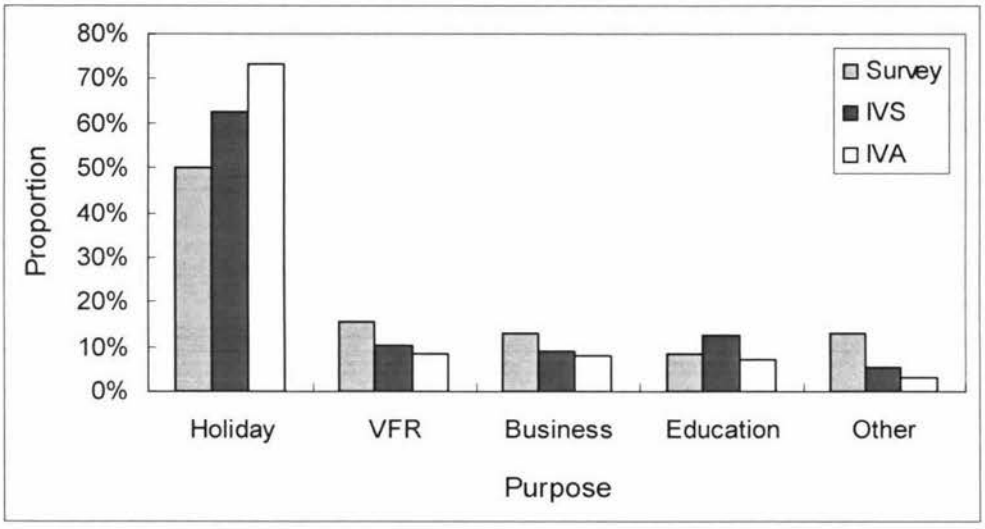
My survey results were compared with results from IVS March 2005 and IVA October 2005. Since both IVS and IVA have larger sample size, these results are more reliable. The comparisons with my survey results could suggest whether my survey results represent the overall Japanese travellers and thus the validity of my survey results. Also IVS/IVA shows the dynamics of Japanese tourists.

#### *4.2.2.1 Purpose of Visit*

The general tendency was similar between my survey results and IVS/IVA; the largest proportion of Japanese travellers was for the purpose of holidays (Fig. 22). However, there were less holiday travellers visiting New Zealand in my survey compared to IVS/IVA. This was possibly because several tour leaders/guides of the large travel groups refused to deliver the questionnaires. These groups were most likely to be

holiday visitors and perhaps a large proportion of holiday travellers from Japan in New Zealand. The questionnaire was delivered in July when it was unlikely for many educational visitors to leave New Zealand. Many educational visitors tend to depart New Zealand at the beginning of the summer school holiday (November – December). Thus, both my survey and IVA showed the lower proportion of education visitors. The IVA October 2005 results showed that the number of education visitor arrival was the lowest of all four main purposes from March to July 2005 (Statistics New Zealand, 2005a).

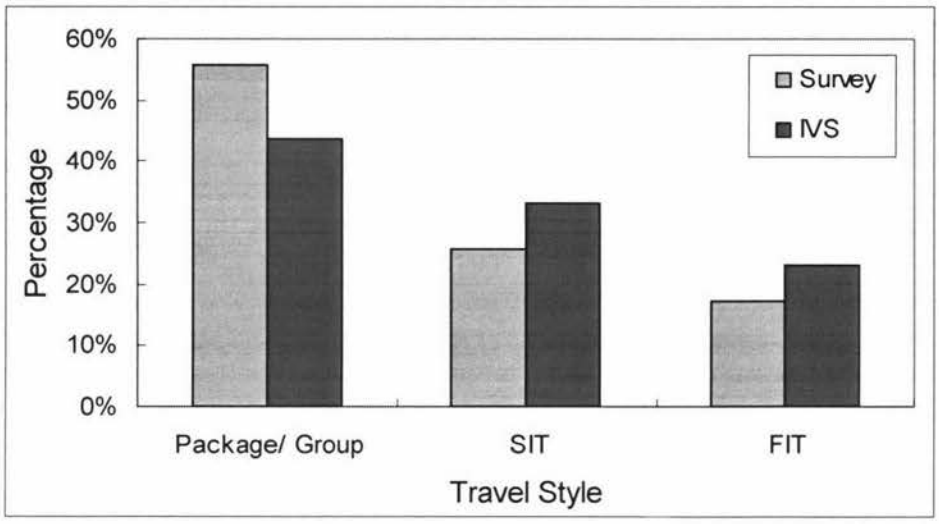
**Fig. 22 The comparison of my survey (n = 70), IVS (annual visitor from Japan, n = 154,380) and IVA (monthly arrival from Japan in July 2005, n = 10,728) for the purpose of visit.**




### *4.2.2.2 Travel style*

Again, there was a similar trend between the two (IVA does not show travel style). Both my survey and IVS indicated that package/group (escorted & package in my survey) travellers were the largest segment for Japanese travellers in New Zealand, and FIT were the smallest (Fig. 23).

**Fig. 23 The comparison of the survey (n = 70) and IVS (n = 154,380) for the travel style.**

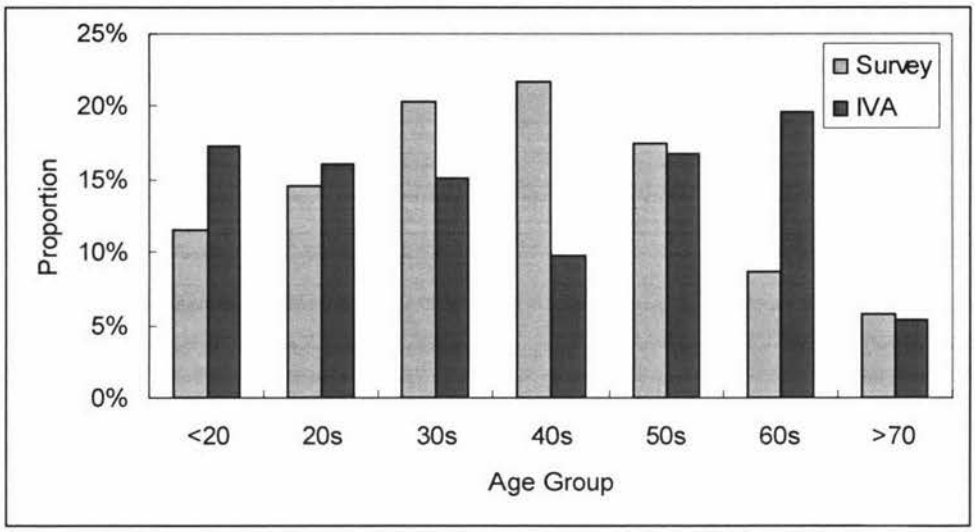



### *4.2.2.3 Demographics*

IVS showed that the largest age group of Japanese travellers was the 55 to 64 years age group (27 %) and the younger age group (15 to 24) was most likely to be students (21 %). IVA also indicated a similar result; 15 to 19 years group was the largest (12.4 %) and the second largest age group was aged between 60 and 64 (11.9 %). These results were different from my survey. My survey showed that travellers in their 40s were the largest age group while it was the second smallest group in IVA (Fig. 24). The possible reason for less younger travellers was due to the time of the survey conducted.

Typically, there are more female travellers than male travellers from Japan. In the year ended October 2005, there were 56 % females and 44 % males (IVA). In my survey 35 % of the respondents were males.

**Fig. 24 The comparison of my survey (n = 69) and IVA (n = 159,261) in age of the Japanese travellers.**




*4.2.2.4 Accommodation*

My survey differed from IVS according to the visitor nights by accommodation type (Fig. 25), but both showed the similar results in terms of the number of Japanese travellers using each accommodation type (Fig. 26). This was probably due to a small sample size in my survey (n = 70) and the number of visitor nights was skewed by a few travellers who stayed for a few months.

**Fig. 25 The comparison between my survey (n = 70) and IVS (n = 154,380) for the visitor night at each accommodation type used.**

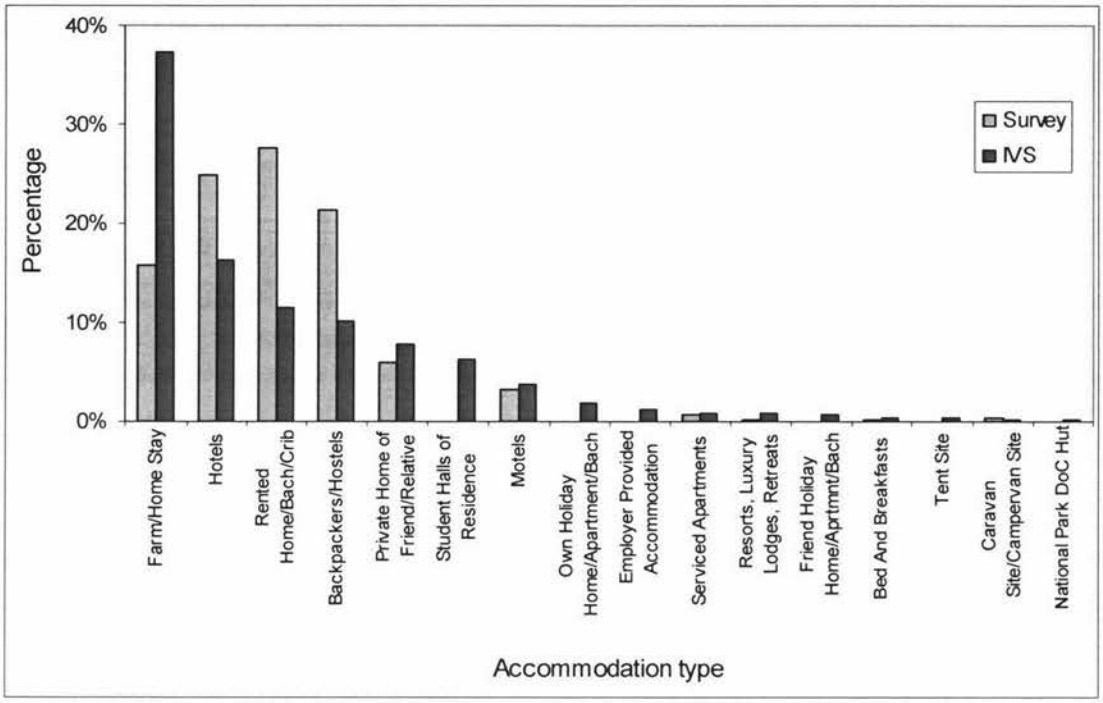
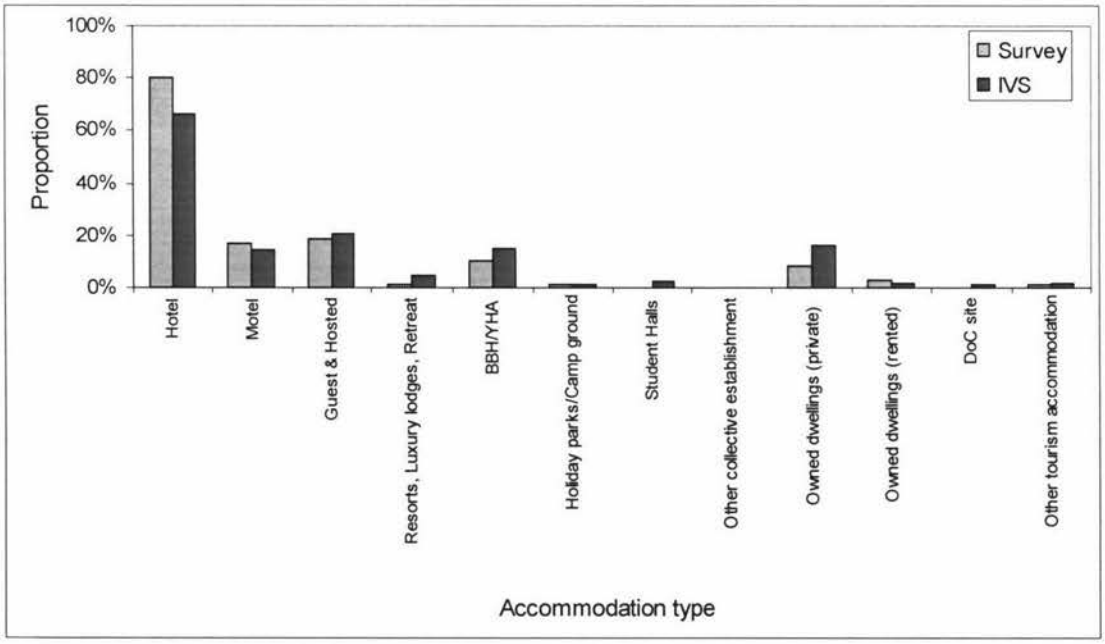



**Fig. 26 The comparison between my survey (n = 70) and IVS (n = 154,380) in the number of travellers at each accommodation type.**



### *4.2.2.5 Length of Stay*

IVS indicated that the average length of stay was 21.9 days, which was longer compared with 17 days in my survey. This relatively longer stay in IVS was probably because more educational visitors were included in the IVS. However, the overall tendency was similar; namely the largest class was five to seven days for both the survey and IVS (Fig. 27). Both results showed that education and 'other' travellers normally stayed longer than holiday, business, and VFR travellers. Holiday visitors stayed in New Zealand for the shortest time. My survey results showed that the business visitors seemed to stay longer than in IVS (Table 22). This was because of one particular business traveller who stayed for 180 days, but the median was eight days.

**Fig. 27 The comparison of the survey (n = 70) and IVS (n = 154,380) for the length of stay.**

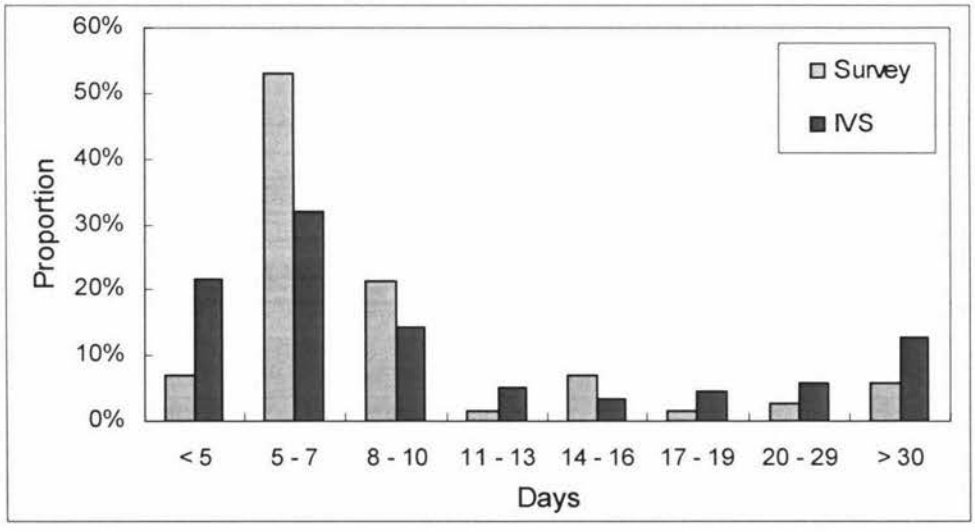



**Table 22 The average length of stay by purposes of visit from IVS (n = 154,380) and my survey (n = 70).**

| | IVS (days) | Survey (days) | SD of survey |
|---|---|---|---|
| Holiday | 12 | 7 | 22.1 |
| Business | 12 | 32 | 52.6 |
| VFR | 13 | 10 | 11.0 |
| Education | 58 | 30 | 37.0 |
| Other | 89 | 39 | 79.9 |
| Overall | 22 | 17 | 174.7 |

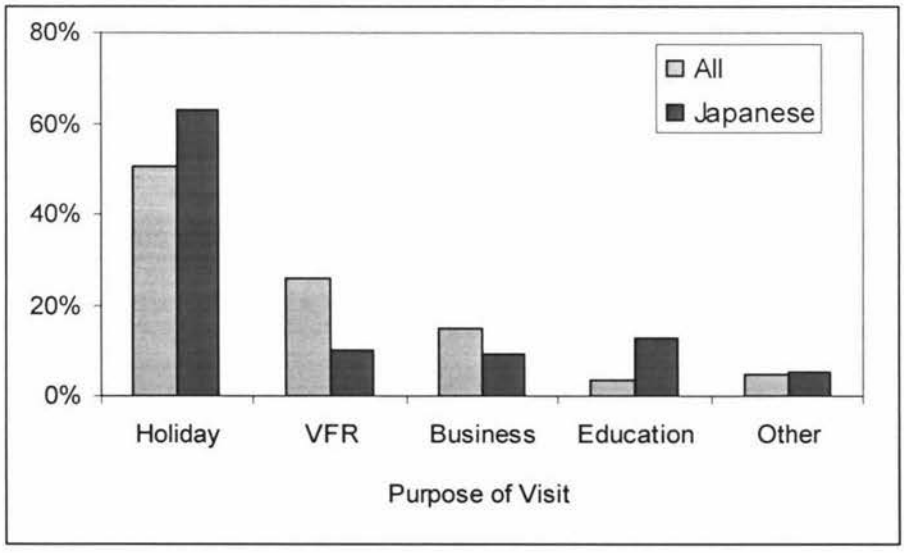
### 4.2.3 Comparisons of Japanese Travellers with All International Visitors

The percentage of Japanese travellers and overall international visitors to New Zealand were compared in various aspects using the results from IVS March 2005. The comparisons indicate the uniqueness of Japanese travellers in New Zealand.

#### *4.2.3.1 Purpose of Visit*

Comparisons of the visitors by purpose of visit showed that Japanese travellers were more likely to visit New Zealand for holidays and education (Fig. 28). There were less Japanese VFR visitors compared to overall result.

**Fig. 28 The comparison of Japanese visitors (N = 154,380) with all international visitors (N = 2,180,363) in New Zealand by purpose of visit, from IVS March 2005.**




#### *4.2.3.2 Travel style*

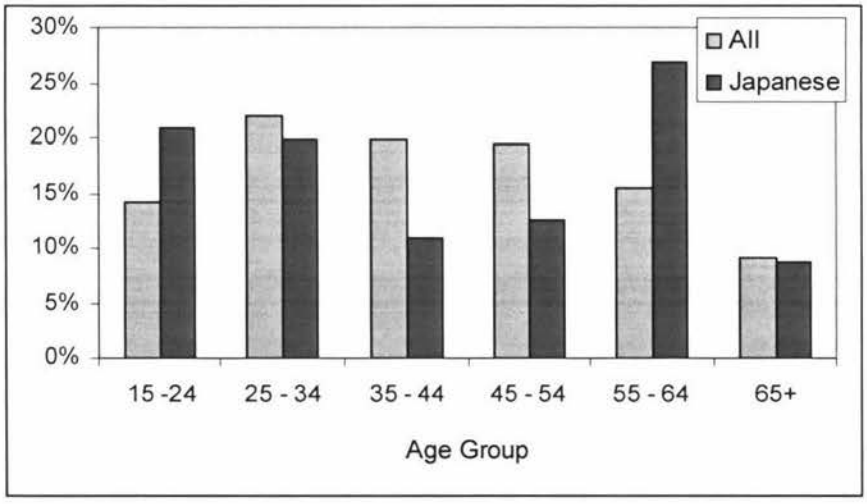
Overall, the majority of international visitors are FITs in New Zealand (56 %), a third are SITs, and only a small proportion are package or tour group travellers (Ministry of Tourism, 2005a; NFO New Zealand, 2002). On the other hand, package tourists were the largest for Japanese (39 %) followed by SIT (33 %) and FITs (23 %) (Ministry of Tourism, 2005a).

### *4.2.3.3 Demographics*

The age cohort of the visitors was also different between Japanese travellers and the overall international visitors in New Zealand (Fig. 29). For Japanese, the travellers between 55 and 64 years of age was the largest of all age group and the younger travellers (<24 years old) was the second largest age group. The age group of overall international visitors were more evenly distributed while there were more young travellers.

The proportion of male Japanese travellers was 56 %, and females 44 % (IVA Oct 2005), compared with 52 % male for all international visitors are, and 48 % female.

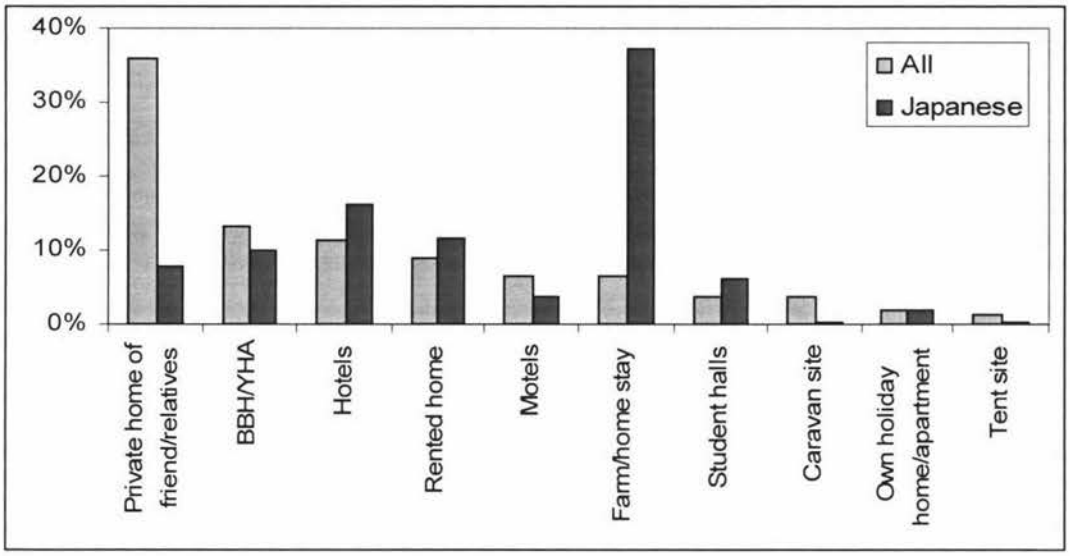
**Fig. 29 The comparison of Japanese visitors (N = 154,380) with all international visitors (N = 2,180,363) in New Zealand by age group, from IVS March 2005.**




### *4.2.3.4 Accommodation*

Sixty-six % of Japanese travellers stayed in hotels compared with 47 % of all international visitors. A private home of friends or relatives was the second highest accommodation type for all international travellers (39 %). In terms of the total number of visitor nights, farm and home stay was the most common accommodation for Japanese followed by hotels (Fig. 30). In contrast, a private home of friends and relatives were more common accommodation for all international travellers, may be due to the higher proportion of VFR travellers.

**Fig. 30 The comparison of Japanese visitors (N = 154,380) with all international visitors (N = 2,180,363) in New Zealand by the number of nights in main accommodation type, from IVS March 2005.**




### *4.2.3.5 Length of stay*

Average length of stay for Japanese was 21.9 days and 22.5 days for all international visitors. Although the average length of stay is similar, the distribution is different (Fig. 31). More Japanese tend to stay shorter than overall international visitors as over 30 % of Japanese stay five to seven days, and there were more overall international visitors stayed longer.

The average length of stay for Japanese travellers was shorter than travellers from many other key markets in New Zealand (Table 23). Visitors from Europe tend to stay in New Zealand longer than any other key markets, as the average length of stay for these European is over 30 days. Australians stay the shortest on average, may be due to the distance being the closest and the travel is easier than any other countries.

**Fig. 31 The comparison of Japanese visitors (N = 154,380) with all international visitors (N = 2,180,363) in New Zealand by the length of stay, from IVS March 2005.**

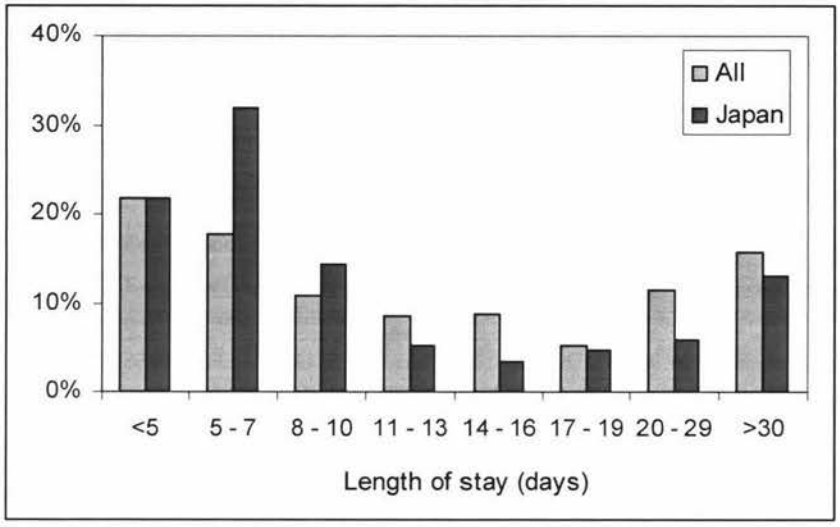



**Table 23 The average length of stay by origin (from key markets) from IVS March 2005.**

| Average length of stay by origin | Days |
|---|---|
| Switzerland | 51.2 |
| Other Central Europe | 41.9 |
| Germany | 41.7 |
| Thailand | 38.3 |
| Other North Asia | 33.5 |
| Canada | 32.8 |
| Other Countries | 31.6 |
| UK | 30.3 |
| Other South East Asia | 29 |
| Malaysia | 27.1 |
| Taiwan | 24.2 |
| South Korea | 23.9 |
| Overall (all international visitors combined) | 22.5 |
| **Japan** | **21.9** |
| Singapore | 19.8 |
| USA | 17.9 |
| Hong Kong | 17.4 |
| Australia | 12.3 |

#### *4.2.3.6 Activities/attractions*

Some activities may influence on their energy consumption largely because some activities require a large amount of energy. Comparisons of Japanese and all international travellers who undertook more energetic activities are shown in Table 24. The major differences were scenic flight and dolphin/whale watching. Scenic flight was more popular among Japanese travellers (10 % of Japanese travellers) and dolphin and whale watching was less popular for Japanese (5.7 % compared to 10 % for all).

In addition, shopping was one of the main focuses of the trip for Japanese travellers as 80 % of them go shopping compared to 64 % of all international visitors.

**Table 24 Comparison of energy intensive activities undertaken by Japanese visitors (N = 154,380) and all international visitors (N = 2,180,363), from IVS March 2005.**

| Activities | Energy intensity (MJ/tourist) | All | Japanese |
|---|---|---|---|
| Jet boating | 237 | 10.6 % | 10.4 % |
| Scenic flight | 340 | 5.5 % | 10.0 % |
| Milford Sound (boat cruise) | 215 | 5.8 % | 3.6 % |
| Dolphin and Whale watching | 237 | 10.0 % | 5.7 % |

#### *4.2.3.7 Transport*

Domestic air is the most frequently used commercial method of travel for both all international travellers and the Japanese travellers, but the preferences differed; 37 % of all international visitors used domestic air compared with 63 % of Japanese travellers.

Rental cars are the second most frequently used transport method for overall international visitors (33 %), followed by private cars (24 %) (IVS); in comparison, only 29 % of Japanese travellers drove a car or van (both rental and private) in New Zealand. Coaches were the second most popular transportation method for Japanese (61 % of Japanese travellers) while only 21 % of all international visitors used tour coaches.

## 4.3 Pilot Study

Most places visited during the pilot study were the popular destinations for many Japanese (e.g., Auckland, Waitomo Caves, Christchurch, and Mount Cook), and I encountered many other Japanese tours during the trip. Information about the accommodation we stayed was also available on the websites of Japanese travel companies (in Japanese), which indicated that these accommodation sites were likely to be used by many other Japanese tourists. Some accommodation places (especially Hermitage Aoraki Mount Cook and Copthorn Christchurch Central Hotel) were particularly popular with Japanese tourists (including many package travellers). I saw many Japanese tourists at these hotels and the services available at these hotels (e.g., meals and sightseeing pamphlets) were particularly targeting Japanese travellers.

### 4.3.1 Survey

The survey questionnaire was delivered to 14 tour members at the end of the trip. The response rate was 100 %.

#### *4.3.1.1 Background Information*

The group consisted mainly of people in their 50s (11 people) with two people in their 60s and only one person in her 30s. There were two males and 12 females. Many of the group members were government officials including teachers and some were unemployed (either retired or housewives) (Fig. 32).

The yearly household income ranged from NZ$22,500 to NZ$225,000 in the group. The largest group was between NZ$45,000 and NZ$67,500 (Fig. 33). Since the average Japanese household income was JP¥ 5.8 million (equivalent to NZ$72,500) (The Japan Times, 2005), these travellers were not particularly wealthy in terms of their household income. However, the fact that many of them were not in work force and their age distributions suggested that this group might have more disposable income since their children are independent.

The reason/motivation for choosing New Zealand as their travel destination

was mainly because of New Zealand scenery and safety (Fig. 34). Almost everyone (all except one person) chose scenery as one of three important reasons, and nine people chose safety as an important reason to choose the destination.

**Fig. 32 The occupations of the travellers in the pilot study trip, in February 2005 (n = 14).**

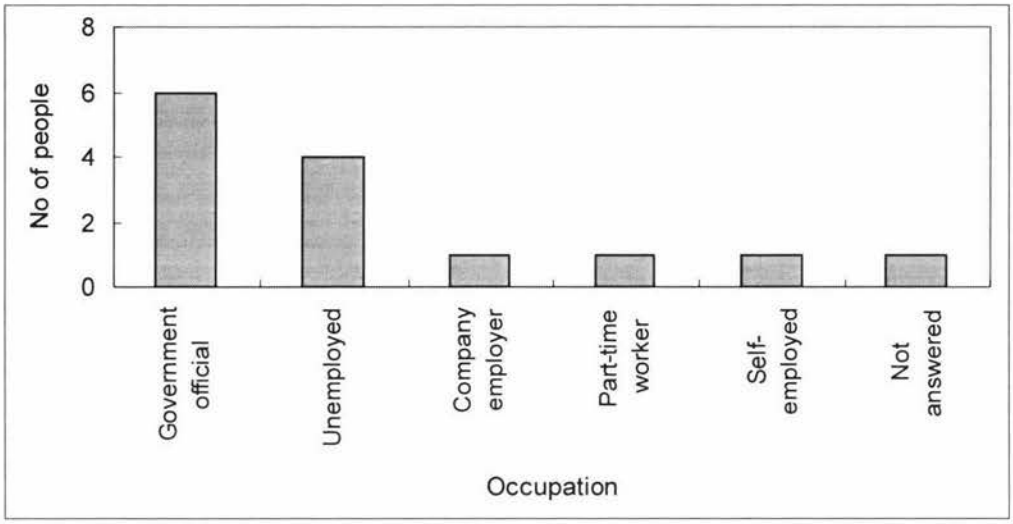



**Fig. 33 The household income of the travellers in the pilot study trip, in February 2005 (n = 14).**

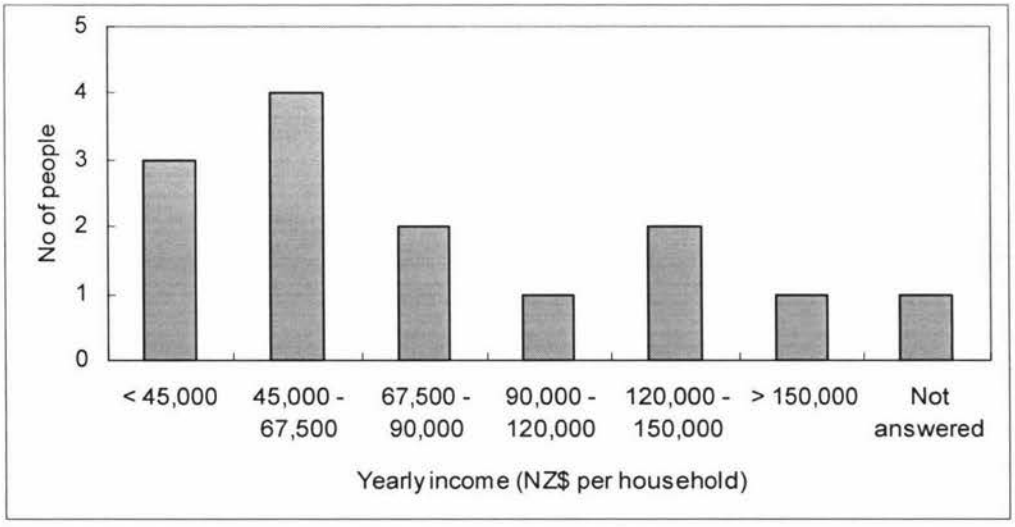
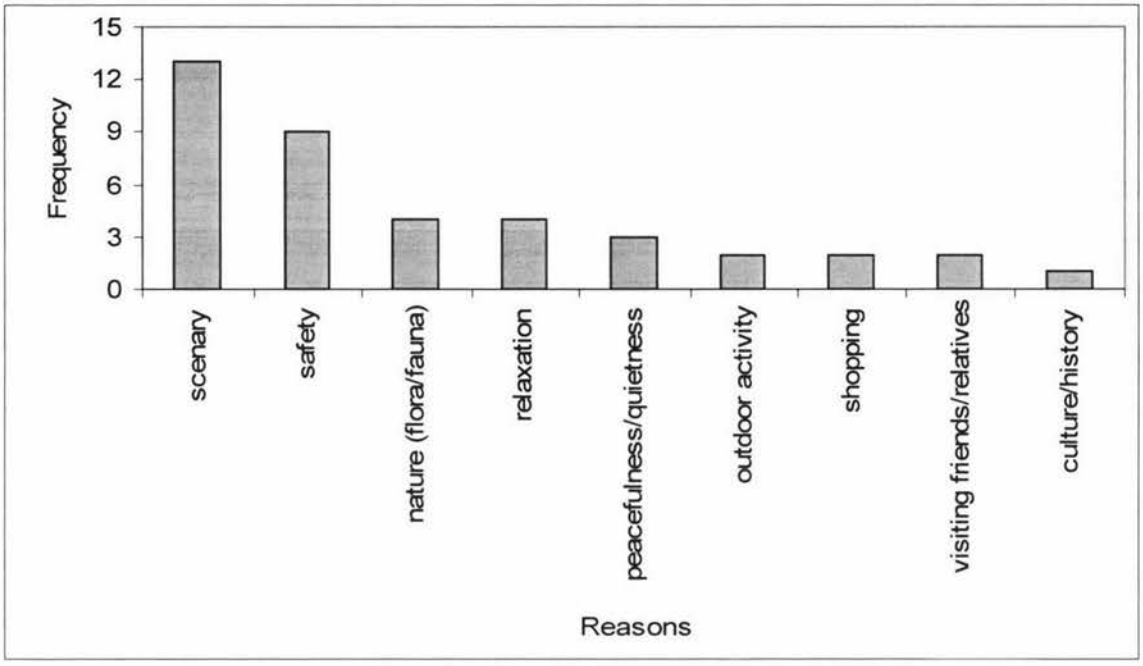


**Fig. 34 The reasons to choose visiting New Zealand from the survey in the pilot study trip, in February 2005 (n = 14).**




### *4.3.1.2 Shopping behaviour*

The average expenditure on souvenir shopping was NZ$852 (median: NZ$ 875) per person (Fig. 35).

The most popular souvenir products were chocolate (average 10 boxes per person), postcards (eight each), and cookies (five boxes per person) (Fig. 36). Nine travellers bought woollen cloths.

**Fig. 35 The amount of money spent for souvenir shopping (per person) from the survey in the pilot study, in February 2005 (n = 14).**

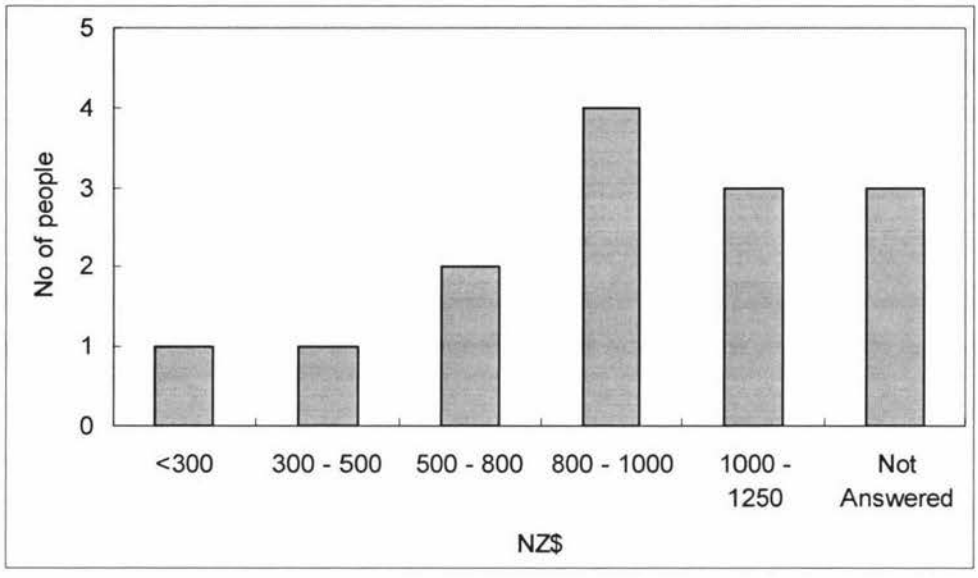
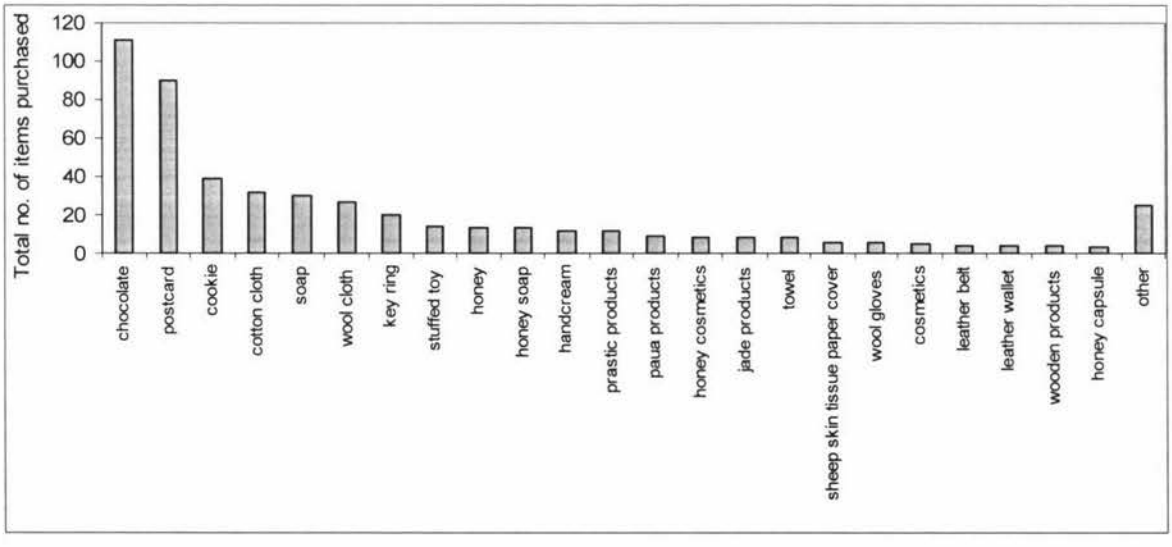



**Fig. 36 The total number of souvenir items purchased during the pilot study trip, in February 2005 (n = 14).**




### 4.3.2 Transportation

Several different modes of transportation were used during the trip. Bussing was the main road transportation method, while two shuttle buses were used for a shorter distance travels (e.g., going to airports from hotels in Wellington and Christchurch).

Domestic flights were also used twice (from Wellington to Christchurch and Christchurch to Auckland).

Two nineteen-seater buses were chartered for the trip (one in North Island and one in South Island). The following table showed the details of the bus used (Table 25).

**Table 25 Details of buses used during the pilot study, in February 2005.**

| | North Island | South Island |
|---|---|---|
| Vehicle type: | Toyota (automatic), made in 1993 | Toyota 'Coaster' (manual), made in 1996 |
| Size of engine: | 2.8 L | 2.4 L |
| Fuel type: | Diesel | Diesel |
| Fuel efficiency: | Approx. 4 km/ litre | Approx. 4.5 km/ litre |
| Amount of fuel consumed: | 187 L | 166 L |
| Distance travelled: | 788 km (from Auckland to Wellington via Waitomo) | 740 km (Christchurch to Mt Cook return) |

## *4.4 Japanese Waitomo Full-Day Tour*

The tour departed from Auckland in the early morning and visited Waitomo Caves and the surrounding areas (one of the most popular tourism destinations in New Zealand, especially for Japanese tourists) (see table 26 for a detail of the tour schedule). This tour was designed only for Japanese tourists and cost $225 per adult. A bus was the only transportation method used on the day (Fig. 37 and Table 27 for a detail of the bus) apart from a small boat (with no engine) inside of the Waitomo Cave.

This tour departs daily all-year round. Although the number of tourists varies depending on the season with more tourists in summer, there are usually around 15 Japanese tourists in this particular tour (personal communication with bus driver/tour guide, Peter Blakeborough). There were 18 other Japanese tourists on that day. The highlights of the tour were:

- Morning and Afternoon tea/ break in Huntly (with a souvenir shop) (Fig. 38);
- Angola rabbit shearing demonstration in 'The Shearing Shed' (with a souvenir shop);
- BBQ buffet lunch in 'Roseland BBQ Restaurant' (with souvenir shop) (Fig. 39); and
- Waitomo Caves Glowworm tour (with souvenir shop) (Fig. 40).

A Japanese tour guide (Masakazu Senda) said that this was a typical itinerary for Japanese tourists (visiting The Shearing Shed, Roseland BBQ lunch, and Waitomo Caves tour). In fact, I noticed at least five different Japanese bus tours during the trip.

The BBQ buffet style lunch was provided at Roseland Restaurant in Waitomo. According to the chef in the restaurant, who is also Japanese, 80 – 90% of their customers are Japanese. The tourists have a choice of beef or fish for their BBQ lunch, but the beef is more popular than the fish because the Waikato Region (and the surrounding) is famous for beef faming (personal communication with the chef). On that day, 13 people chose beef and six people chose fish.

Although there were morning and afternoon tea-breaks allocated in the itinerary (in Huntly), only few (around five) people actually had something to eat or drink in the café. While most Japanese tourists spent their entire 20-25 minutes break for further souvenir shopping.

At the Shearing Shed in Waitomo, the tourists viewed a rabbit shearing demonstration and some people purchased their Angora rabbit products. Shop staff told me that "many many" Japanese tourists visit their shop everyday and they enjoy shopping. During the 20 minutes stop in that shop, two more Japanese bus tours arrived at the same shop.

**Table 26 Scenic Tour: Waitomo Express Full-Day Tour (for Japanese) Itinerary.**

| Time | Place | Detail Activity |
|---|---|---|
| 7:00 | Accommodation | Pick-up travellers from each accommodation and go to their Office |
| 7:20 | Scenic Tour Auckland Office | Payment |
| 7:30 | Depart Auckland | |
| | Huntly | Morning Tea/Toilet break (25 min) (some souvenir shopping) |
| 10:45 | Hamilton (Flanklin Rail Station) | Pick-up some other Japanese travellers |
| | Angola Shearing Shed, Waitomo | Angola rabbit shearing show & some Angola rabbit products shopping |
| | Roseland Restaurant, Waitomo | BBQ buffet Lunch & some souvenir shopping |
| 13:00 | Waitomo Caves | Glow worm tour (40min) & souvenir shopping (5-10min) |
| | Huntly | Afternoon Tea/Toilet break (20min) (some shopping) |
| 16:30 | Auckland | Drop-off travellers at each accommodation |

**Table 27 Details of the bus used in the tour.**

| | |
|---|---|
| Vehicle type: | Coach MAN, made in Germany in 1994 |
| Size of bus: | 28 seats |
| Size of engine: | approx. 200 horse power |
| Fuel type: | Diesel |
| Fuel consumption rate: | 8 km/ litre |

**Fig. 37 A photo of the bus (left) used for Waitomo Caves Tour, taken in Roseland Restaurant car park in Waitomo. Another bus (right) is also for a Japanese tour.**


**Fig. 38 Morning and afternoon tea / toilet breaks in Huntly.**

**Fig. 39 Souvenir shop in Roseland BBQ Restaurant in Waitomo. As soon as they finish their lunch, most tourists rushed into the souvenir shop.**

**Fig. 40 Waitomo Glowworm Caves, in Otorohanga, Waitomo. This was the highlights of the tour and one of the most popular tourism destinations in New Zealand.**

## *4.5 Package Tour Itinerary Summary*

A total of 104 escorted tour itineraries collected from eight different travel wholesalers/ retailers were compared and found to be generally similar with slight variation among the companies. Even though some tours were seasonal (e.g., April to May for autumn colour sight tour, or winter trip for ski and snowboarding), many tours were available for over six months. Travel routes and (long-distance travel) transportation methods of the Escorted tours were mapped. Most trips focused on traditional destinations such as Auckland, Rotorua, Waitomo Caves, Christchurch, Tekapo, Mount Cook, Queenstown, and Milford Sound. However, some travel companies started including other relatively newly recognised tourism destinations, for example, Wanaka, Dunedin, Te Anau, Tongariro National Park, Arthur's Pass, and Hanmer Springs. The only tours going to West Coast of South Island were Milford Sound (Appendix 3).

The table below is one example of an escorted tour itinerary from one of the largest wholesaler, Jalpak (Table 28). This is an eight days trip from Tokyo, and the title of the tour is "Every Aspect of New Zealand for eight days". This tour was a typical escorted tour for Japanese tourists and included highlights which were 'must-do' activities and destinations popular among the Japanese travellers in New Zealand. The tour includes five breakfasts, four lunches and four dinners, and cost ¥403,000 (NZ$5,000) per person (twin room shared). The tour was available during March 2005.

The detail of meal plans from different tour organisers generally showed how similar they were. As shown in the meal plan from Hankyu Travel, eight days escorted trip, the escorted Japanese travellers enjoyed a mixture of New Zealand (Western and hangi/ Maori feast) and Japanese/ Asian cuisines (Table 29). One notable difference was that the other companies also included several buffet style meals.

**Table 28 One example of escorted tour itinerary for 8 days tour (from Jalpak).**

| Days | Place | Schedule | Meals |
|---|---|---|---|
| 1 | Tokyo | Depart Tokyo to NZ by Air NZ/JAL code share flight<br>Stay in-flight | Dinner: in-flight meal |
| 2 | Christchurch | AM: Arrive at Christchurch<br>Then: City sightseeing (punting & photo opportunity on Avon River, tram ride, Cathedral Square, etc).<br>Evening: "Floral dinner"<br>Overnight stay in Christchurch<br>(Premium room in Millennium Hotel) | Breakfast: in-flight meal<br>Dinner: in Christchurch |
| 3 | Christchurch<br>Arthur's Pass | Full day: To Arthur's Pass by Tranz Alpine Express (train) (this trip includes lunch, farm show & farm visit, and jet boat on Waimakariri River).<br>Overnight stay in Christchurch<br>(Premium room in Millennium Hotel) | Breakfast: in hotel<br>Lunch: Restaurant in Arthur's Pass |
| 4 | Christchurch<br>Mt Cook<br>Queenstown | AM: Depart Christchurch to Lake Tekapo then Mt Cook by bus. Take a walk at Mt Cook NP (option: scenic flights to glacier in Mt Cook).<br>PM: Depart Mt Cook to Queenstown<br>Overnight stay in Queenstown<br>(Novotel Gardens hotel) | Breakfast: in hotel<br>Dinner: Japanese Restaurant in Queenstown |
| 5 | Queenstown<br>Milford Sound | Full day: Milford Sound Tour (from Queenstown return by bus), this tour includes scenic boat cruise and lunch on boat<br>Overnight stay in Queenstown<br>(Millennium Hotel) | Breakfast: in hotel<br>Lunch: during boat cruise |
| 6 | Queenstown<br>Rotorua | AM: Depart Queenstown to Rotorua (via Christchurch by domestic flight)<br>Then: City sightseeing (Whakarewarewa, etc)<br>PM: Maori concert & Hangi dinner, then Polynesian Spa<br>Overnight stay in Rotorua<br>(Millennium Hotel) | Breakfast: in hotel<br>Dinner: hangi dinner |
| 7 | Rotorua<br>Auckland | AM: Depart Rotorua to Waitomo Caves<br>Then: Waitomo Caves tour<br>PM: Arrive at Auckland (city sightseeing tour, Mt Eden, Panel, etc) | Breakfast: in hotel<br>Lunch: (in Waitomo) |

| | | | |
|---|---|---|---|
| | | Evening: Harbour view dinner<br>Overnight stay in Auckland<br>(Sheraton Hotel & Towers OR Langham Hotel) | Dinner: Seafood dinner in Auckland |
| 8 | Auckland<br>Tokyo | AM: Depart Auckland to Japan (Air NZ/JAL code share flight)<br>PM: arrive at Tokyo | Lunch: in-flight meal |

**Table 29 One example of the meal plan - Hankyu Express 8 days escorted trip.**

| Days | Meal | Details of meal |
|---|---|---|
| 1 | Dinner: | In-flight meal |
| 2 | Breakfast: | In-flight meal |
| | Lunch: | Light meal |
| | Dinner: | Fish (as main) |
| 3 | Breakfast: | Hotel in Christchurch (Hotel Grand chancellor) |
| | Lunch: | Salmon-Don (salmon on rice) in Japanese Restaurant in Tekapo |
| | Dinner: | Skyline Restaurant on the hill in Queenstown |
| 4 | Breakfast: | Hotel in Queenstown (Aspen Hotel) |
| | Lunch: | Japanese style lunch box in Milford Sound boat cruise |
| | Dinner: | Chinese meal in Queenstown |
| 5 | Breakfast: | Hotel in Queenstown (Aspen Hotel) |
| | Lunch: | Seafood BBQ in Wanaka (Edgewater Resort Hotel) |
| | Dinner: | "Flower Dinner" in Christchurch |
| 6 | Breakfast: | Hotel in Christchurch (Hotel Grand Chancellor) |
| | Lunch: | Skyline Restaurant on the hill in Rotorua |
| | Dinner: | Hangi Dinner (Maori feast) |
| 7 | Breakfast: | Hotel in Rotorua (Lakeplaza Hotel) |
| | Lunch: | Restaurant in Waitomo (Roseland Restaurant) (choice of beef, fish, or lamb) |
| | Dinner: | Dinner sail in Auckland |
| 8 | Breakfast: | In-flight meal |
| | Lunch: | In-flight meal |

## 4.6 Analysis

### 4.6.1 Ecological Footprint Analysis (EFA)

The Ecological Footprint (EF) of a Japanese traveller who spent an average of 16 days in NZ was 0.568 global hectares (gha) per trip excluding international flights. The EF was 1.459 gha per traveller trip if the international flights were included. The table below is a summary of the results of the EFA (Table 30). A detailed individual EF was also calculated (Appendix 5). The total visitor nights by Japanese travellers was 3,379,930 during the year ended March 2005, this equated the total EF of 166,293 gha in that year.

Fossil energy land (or energy footprint) was the largest component of the EF (53 %) among six land area types. Transportation was the largest contributor to overall EF. Within the fossil energy category, 33 % of fossil energy area was due to transportation and every main consumption category contributed in fossil energy land. Built-up land area was the second largest land type while 85 % of built-up land area was due to transportation, namely road (Table 31 & 32).

**Table 30 Summary statistics for EFA and the length of stay.**

| | EF/tourist trip (gha) | EF/tourist/day (gha) | Length of stay (days) |
|---|---|---|---|
| Mean | 0.568 | 0.049 | 16 |
| Standard Error | 0.101 | 0.003 | 5 |
| Median | 0.331 | 0.046 | 7 |
| Mode | N/A | N/A | 7 |
| Standard Deviation | 0.844 | 0.021 | 42 |
| Range | 5.304 | 0.121 | 296 |
| Minimum | 0.117 | 0.017 | 4 |
| Maximum | 5.421 | 0.138 | 300 |
| Sum | 39.747 | 3.442 | 1131 |
| Count | 70 | 70 | 70 |
| Confidence Level (95.0%) | 0.201 | 0.005 | 10 |

**Table 31 Ecological Footprint of an average Japanese traveller per trip in 2005 (global $m^2$/person/trip).**

| Categories | Fossil Energy | Cropland | Pasture | Forest | Built-up | Fishery | Total |
|---|---|---|---|---|---|---|---|
| Food | 148 | 484 | 144 | - | - | 231 | 1,006 |
| Housing | 425 | - | - | 517 | 54 | - | 996 |
| Transportation | 1,004 | - | - | - | 723 | - | 1,728 |
| Goods | 160 | 113 | 23 | 38 | 5 | - | 340 |
| Services | 598 | - | - | - | 42 | - | 639 |
| Waste | 671 | - | - | 264 | 22 | - | 957 |
| Total | 3,006 | 596 | 167 | 820 | 846 | 231 | 5,665 |

**Table 32 Ecological Footprint distributions (%) for an average Japanese traveller per trip in 2005.**

| Categories | Fossil Energy | Cropland | Pasture | Forest | Built-up | Fishery | Total |
|---|---|---|---|---|---|---|---|
| Food | 2.6% | 8.5% | 2.5% | 0.0% | 0.0% | 4.1% | 17.8% |
| Housing | 7.5% | 0.0% | 0.0% | 9.1% | 1.0% | 0.0% | 17.6% |
| Transportation | 17.7% | 0.0% | 0.0% | 0.0% | 12.8% | 0.0% | 30.5% |
| Goods | 2.8% | 2.0% | 0.4% | 0.7% | 0.1% | 0.0% | 6.0% |
| Services | 10.5% | 0.0% | 0.0% | 0.0% | 0.7% | 0.0% | 11.3% |
| Waste | 11.8% | 0.0% | 0.0% | 4.7% | 0.4% | 0.0% | 16.9% |
| Total | 53.1% | 10.5% | 2.9% | 14.5% | 14.9% | 4.1% | 100.0% |

#### *4.6.1.1 Food*

Food was the second largest consumption EF category (17.8 %). On average, one Japanese traveller required 75 global $m^2$ ($gm^2$) for food EF per day (median 77 $gm^2$, maximum 145 $gm^2$, and minimum 17 $gm^2$). In New Zealand, Japanese travellers were likely to experience different eating habits compared with their usual diet in Japan. However, eating habits of Japanese travellers were still different from the ordinary 'Kiwi' diet. According to the tour itinerary obtained from travel wholesalers/ retailers, Japanese travellers seemed to enjoy combinations of Kiwi and Japanese styles. Japanese meals or at least other Asian meals were available from almost all the places on the itinerary at least once, but also there were some meals including the western/ New Zealand cuisine such as lamb/steak or hangi food as New Zealand traditional meals. In addition, many Japanese travellers (especially escorted travellers) tend to

enjoy luxury style with expensive restaurants. Some hotels popular with Japanese travellers also prepared Japanese style breakfasts (rice and miso-soup).

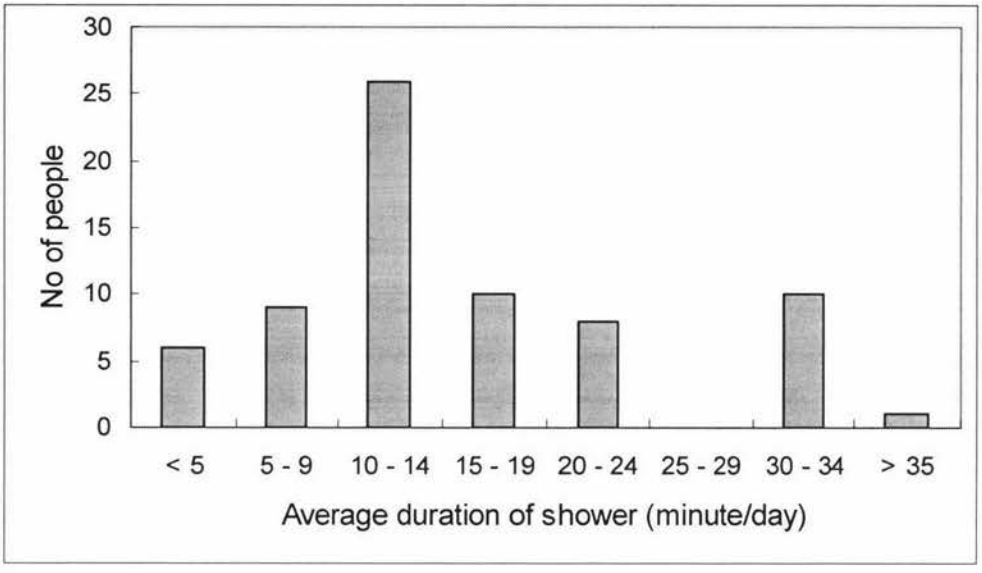
Since many Japanese tourists (78 %) eat out (Ministry of Tourism, 2005a), I assumed that relatively less food would be packaged. But they might not consume locally grown products especially when they ate Japanese or other Asian meals where imported food from overseas was frequently used. For example, rice and many other ingredients for Japanese and Chinese cuisine are imported from overseas. While the vegetables and meats were most likely to be from local farms.

#### *4.6.1.2 Housing/Accommodation*

The housing/accommodation consumption category included a variety of sub-categories. The average housing/ accommodation footprint of one Japanese tourist was 70 $gm^2$ per day (median 74 $gm^2$, maximum 86 $gm^2$ and minimum 46 $gm^2$) and was 17.6 % of the total EF.

In addition, direct water consumption was calculated in this section. On average, one Japanese traveller used 0.22 $m^3$ of water per day (or 3.13 $m^3$ of water per visit). The water was used for toilet, kitchen (food preparation), washing hand/face/teeth, dish washing, shower, bathtub and laundry. The survey showed that the majority (59 % of 70 travellers) of Japanese travellers used the shower for less than 15 minutes a day (Fig. 41). The average shower flow is 8.2 L per minute (BRANZ, 2003), this meant that many Japanese travellers required over 100 litres of water per shower. Eleven of 70 people even required about 250 litre of water per day by taking a shower over 30 minutes. Furthermore, 29 travellers used a bathtub at least once during the trip (average of 2.3 times per trip). If the bathtub was used, it requires about 150 L of water per use.

**Fig. 41 The average duration of shower from the survey.**




### *4.6.1.3 Transportation*

Transportation was the largest source component of the EF contributing 30.5 % of the total EF and average transportation EF was 207 $gm^2$/person/day (median 147 $gm^2$, maximum 1,165 $gm^2$ and minimum 6 $gm^2$). The maximum transport footprint was from a business FIT who travelled New Zealand for 10 days. He drove a car on average eight hours per day for 10 days. Transportation EF consisted of fossil energy land (58 % of transportation EF) and on built-up land (42 %).

### *4.6.1.4 Goods*

Goods footprint was the smallest portion of the total EF (6 %), with an average of 43 $gm^2$/ person/day (median 18 $gm^2$, maximum 50 $gm^2$ and minimum 5 $gm^2$).

### *4.6.1.5 Services*

Services footprint was the second smallest consumption category, occupying 11 % of the total EF. On average, services footprint was 36 $gm^2$/ person/day (median 18 $gm^2$).

### *4.6.1.6 Waste*

The likely wastes produced by tourists are: food scraps, paper or plastic packaging,

plastic bottles, napkins, disposable chopsticks (especially with Japanese or other Asian restaurants), and newspaper (although it was less likely for Japanese tourists to read newspaper in New Zealand due to the language differences). In this study, the average amount of waste generation per capita in New Zealand was applied due to the difficulties in estimating all waste generated by Japanese travellers. A waste EF of a Japanese traveller was 59 $gm^2$/ person/day.

As part of a study to calculate the EF of tourists in Manali, Cole (2000) found the main waste from a large to medium sized hotel was food wastes, paper, packaging, plastic bottles and polythene bags. The same study also indicated that the majority of waste from restaurants was food waste, and the rest of the waste consisted of paper (mainly serviettes), food packaging and plastic water bottles (Cole, 2000).

Restaurants and cafés produce a significant amount of waste. In Waitakere, for instance, almost 70 % of total waste disposed of landfill by the retail sector in 1997 was from restaurants, cafes, and food and beverage outlets although these made up less than 25 % of the retail businesses in the area (Waitakere City Council, 2000). The most significant amount of the waste produced by them was food. One of the restaurants identified that 50 % (13.75 kg per day) of their waste was food (mainly vegetable remains and table scraps) (Waitakere City Council, 2000).

### 4.6.2 Multivariate Statistical Analysis

Classification trees indicated that the purpose of visit and travel style were the two most important factors determining Japanese travellers' EF, even though the accuracy after cross-validation was relatively low. The classification accuracy was 38 % for purpose (or 70 % without cross-validation) and Cohen's Kappa value was 0.19 (or 0.58 without cross-validation). The accuracy of travel style was 42 % and Kappa value was 0.14 (or 78 % accuracy and 0.70 Kappa value without cross-validation). This meant that the size of EF could be predicted from the purposes of visit and travel styles along with other sub-categories (length of stay, gender and age).

VFR travellers and education travellers tended to have smaller EF than holiday or business travellers. The male VFR travellers and the education travellers were likely to have medium size EF (0.035 – 0.065 ha/person/day) (Fig. 42). The

female VFR travellers who stayed over nine days could have large EF (0.05 – 0.065 ha/person/day) but if they stayed less than nine days, their EF would be small (<0.035 ha) or medium.

Business travellers who stayed over 10 days in New Zealand were likely to have small EFs (<0.035 ha/person/day) and male business travellers who stayed less than 10 days were expected to have extremely large EF.

School excursion travellers and female FITs were most likely to have small EF and package travellers might have medium size EF. SITs were most likely to have the larger EF than the travellers with different travel styles. SITs who stayed New Zealand over 11 days tended to have large EF (0.05 – 0.065 ha/person/day) and SITs who stayed for no longer 11 days were likely to have even larger EF (>0.065 ha/person/day) (Fig. 43).

**Fig. 42 Classification of Japanese tourists in New Zealand by purpose of visit, based on the survey in July 2005.**

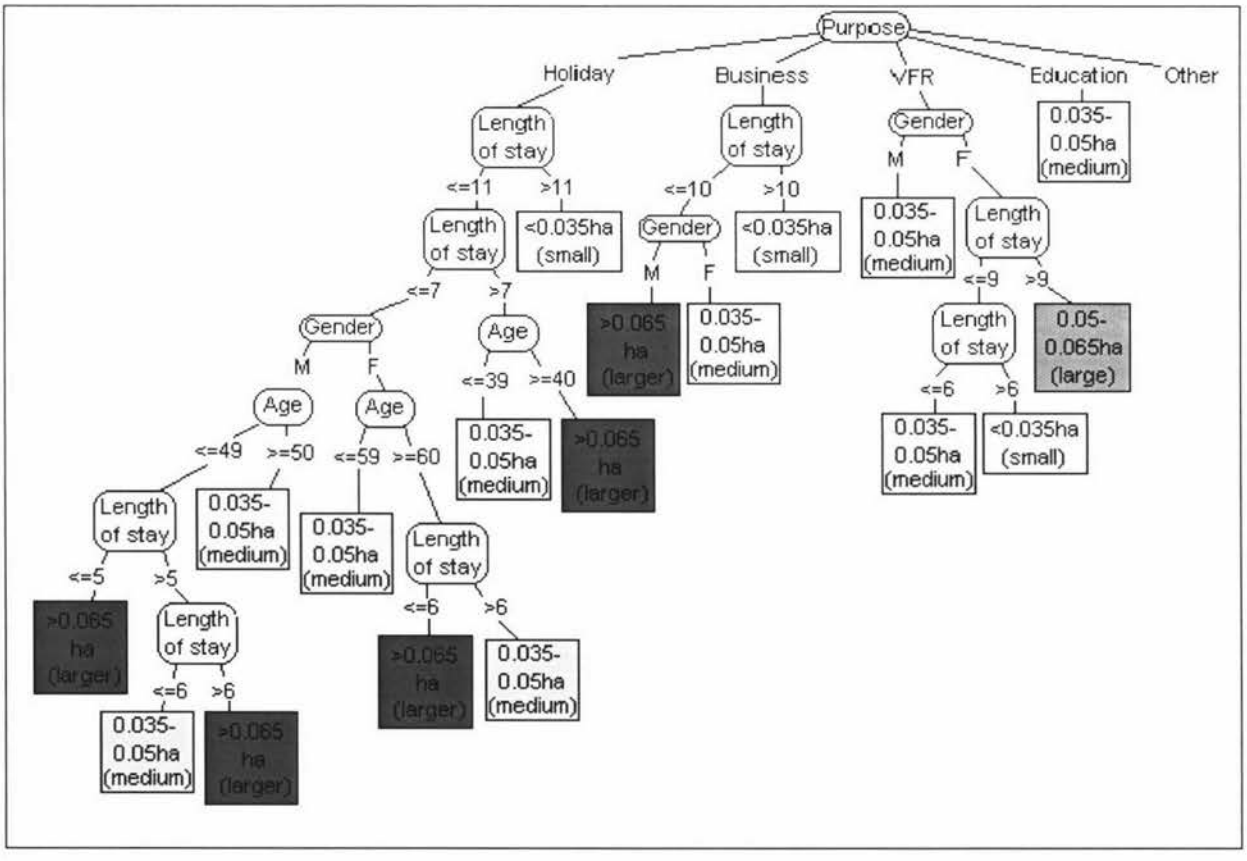
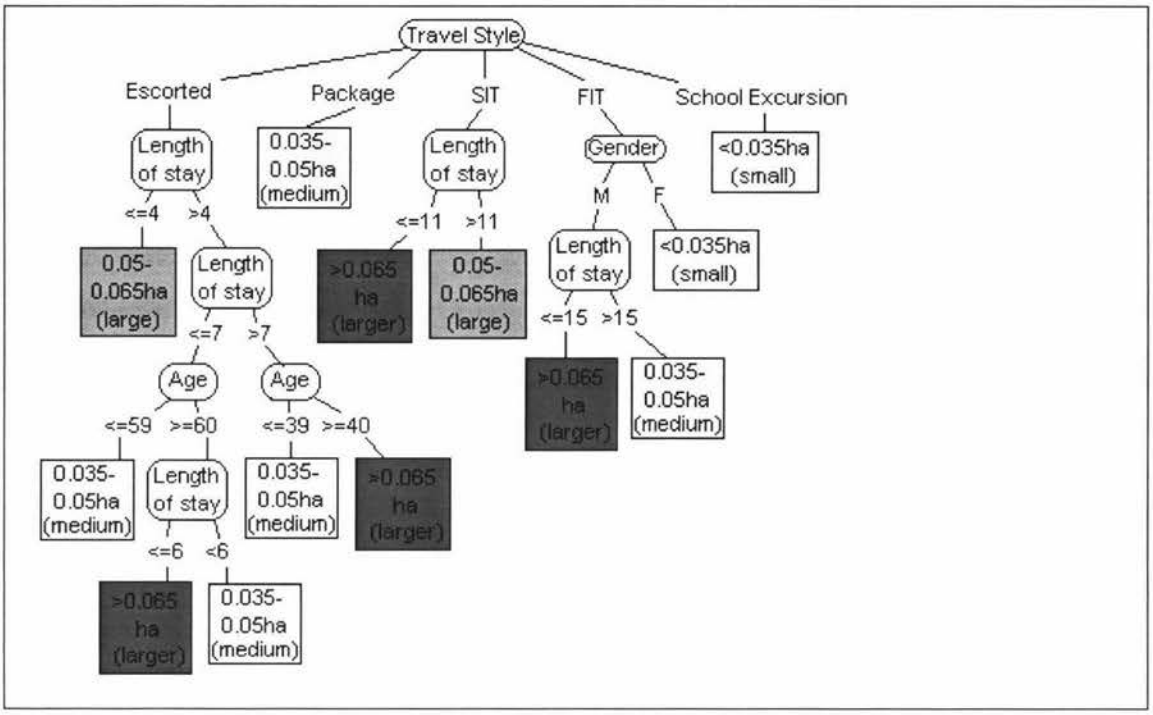


**Fig. 43 Classification of Japanese tourists in New Zealand by travel style, based on the survey in July 2005.**




### 4.6.3 Ordination

Two axes on ordination plots explained 95 % of the information (84 % on axis 1 and 10 % on axis 2). However, there were no clear patterns among travel style or purpose of visit due to lack of groups of symbols (Fig. 44 & 45). The correlations between the axis scores and values of the variables are shown in Table 33. Axis 1 was strongly associated with fossil energy, built-up and transportation EF, which meant that if the individuals were placed on negative (left) end of the axis 1, they consumed considerably large amount of energy and land for transport. Individual A43 was separated from other travellers on axis 1 as his energy, built-up and transport footprints were considerably larger than other travellers. Since axis 1 explained most of the variation of individual EF (84 %), axis 1 could be emphasised. Axis 2 separated the individuals according to fossil energy, transportation and cropland EF.

Both plots (purpose of visit and travel style) showed the same individual patterns. If the individuals were plotted nearby, it indicated that these individuals had similar consumption patterns. All the dots at the positive end (upper right corner)

were travellers who had small EF, and dots at the negative end (bottom left corner) were travellers who had large EF.

**Fig. 44 Ordination plot of individual EF of Japanese tourists in New Zealand by purpose of visit, based on the survey in July 2005 (n = 70).**

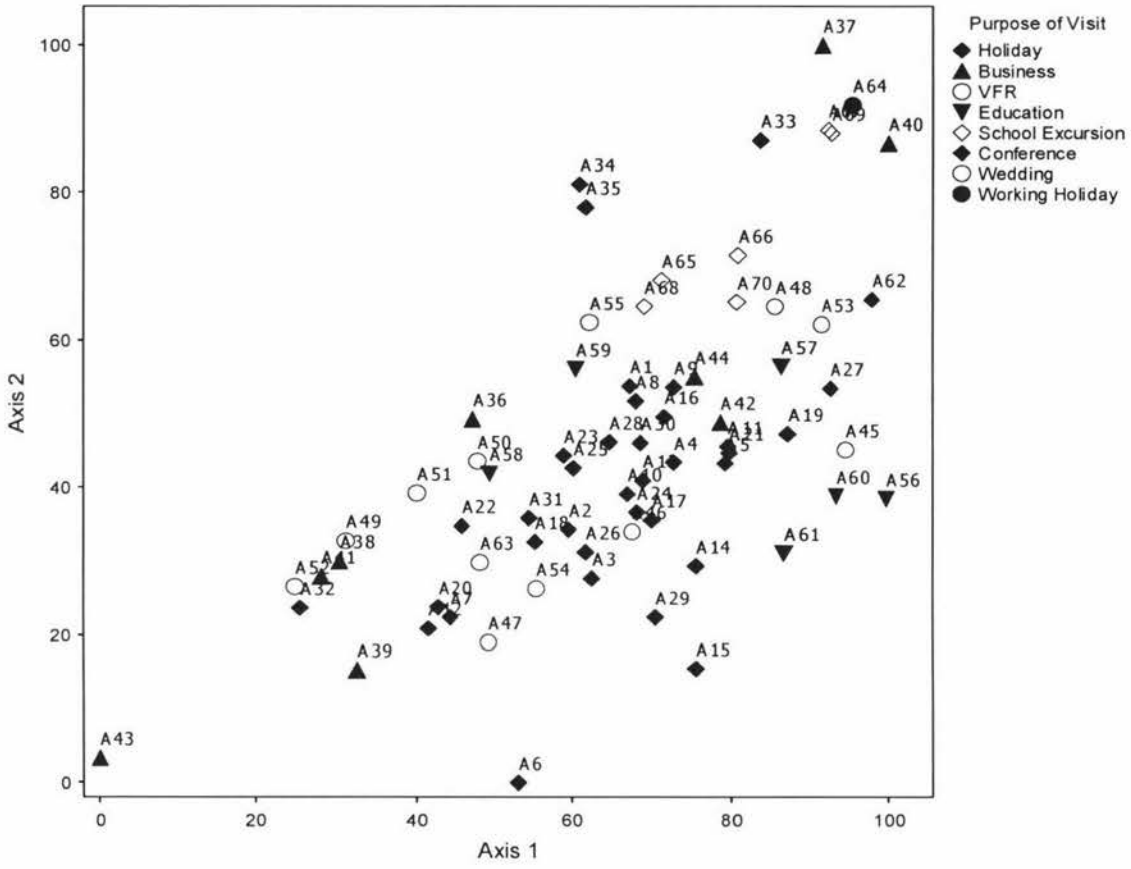


**Fig. 45 Ordination plot of individual EF of Japanese tourists in New Zealand by travel style, based on the survey in July 2005 (n = 70).**

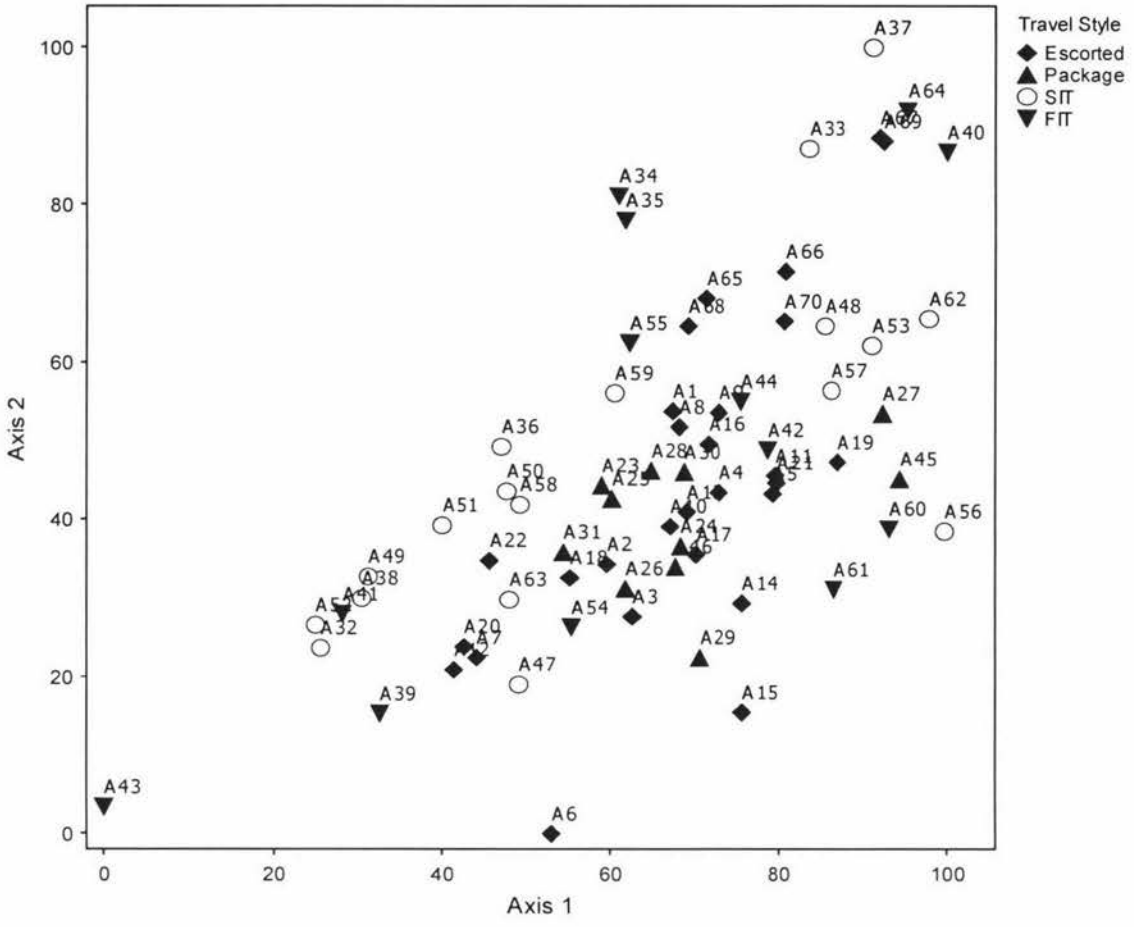



**Table 33 The correlation coefficients for axis 1 and 2 of the ordination plots (significant correlations were in bold).**

| Axis: | 1 | 2 |
|---|---|---|
| Fossil Energy | **-0.74** | **-0.901** |
| Cropland | -0.058 | **-0.548** |
| Pasture | -0.03 | -0.507 |
| Forest | 0.051 | -0.106 |
| Built-up | **-0.859** | -0.499 |
| Fisheries | -0.004 | -0.387 |
| Food | 0.063 | -0.402 |
| Housing/Accommodation | -0.12 | -0.502 |
| Transport | **-0.938** | **-0.645** |
| Goods | -0.092 | -0.518 |
| Services | 0.219 | -0.319 |

### 4.6.4 Statistical Analysis

A range of statistical analyses were carried out to see if there were any significant differences among each segment and the length of stay to affect the EF.

#### *4.6.4.1 EF of Different Segments*

The EFs were relatively similar among different travel styles, which ranged from 0.048 to 0.051 gha/person/day. There were more differences among the travellers with different purpose of visits (Table 34). The business travellers had the largest average daily EF (0.060 gha/person/day). VFR travellers had the second largest EF and holiday travellers were the third. Overall, business FITs had the largest average EF of all (0.067 gha/person/day) while the smallest was FIT visited New Zealand for 'other' purpose (0.018 gha/person/day).

**Table 34 Average EF by purpose of visit and travel style (global ha/traveller/day).**

| | Escorted | Package | SIT | FIT | Overall |
|---|---|---|---|---|---|
| Holiday | 0.053 | 0.049 | 0.055 | 0.029 | 0.051 |
| Business | - | - | 0.046 | 0.067 | 0.060 |
| VFR | - | 0.046 | 0.057 | 0.050 | 0.054 |
| Education | - | - | 0.040 | 0.043 | 0.041 |
| Other | 0.027 | - | 0.047 | 0.018 | 0.030 |
| Overall | 0.048 | 0.049 | 0.050 | 0.051 | 0.049 |

##### *4.6.4.1.1 Purpose of Visit and EF*

Business travellers had the largest average daily EF and the largest standard error. Holiday travellers had least variation within the group, even though the largest in number (Fig. 46). T-tests (n = 69) indicated that education and 'other' travellers (including school excursion) had significantly smaller EF than holiday and VFR visitors (Table 35). There were not significant differences among other segments. The average EF of business travellers was larger than other segments, but the t-test (n = 69) result did not indicate any significant differences, due to the large variation within the segment. Although the average indicated the business travellers had the

largest EF, the median showed that EF of VFR traveller was the largest (0.054 $gm^2$/day) and the median of business travellers was the second largest (0.050 $gm^2$/day).

The daily EF of each purpose of visit was also analysed with each consumption category. There was no significant difference for food, but there were significant differences for housing, transportation, goods and services. However, EFs for the housing, goods and services categories were relatively small and were only small fractions of EFs (18 %, 6 % and 11 % respectively). Housing EFs showed that holiday travellers had significantly larger EF than VEF and 'other' purposes travellers (Fig. 47 & Table 36). T-tests (n = 69) for transport footprint showed that holiday travellers had significantly larger transport footprint (196 $gm^2$/person/day) than 'other' travellers (88 $gm^2$/person/day), and VFR travellers had significantly larger transport footprint (262 $gm^2$/person/day) than education (98 $gm^2$/person/day) and 'other' travellers (Fig. 48 & Table 37). Although the average transportation EF of business travellers was the largest (372 $gm^2$/person/day), it was not statistically significant. For goods consumption category, holiday and VFR travellers seemed to have larger EFs but only holiday travellers had significantly larger EF (57 $gm^2$/person/day) than travellers for other three purposes (Fig. 49 & Table 38). Education travellers had the largest EF for services category (100 $gm^2$/person/day) and it was significantly larger than business, VFR and 'other' travellers (Fig. 50 & Table 39). Holiday travellers also had significantly larger EF (41 $gm^2$/person/day) than other three categories for services.

The daily EF was also compared by each land type. However, only fossil energy land and built-up land were statistically tested to see the significant differences since other land types (cropland, pasture, forest and fisheries) were only small portions of EF (less than 60 $gm^2$/person/day). The average daily energy footprint was the largest for holiday travellers (305 $gm^2$/person/day) and was significantly larger than 'other' travellers (Fig. 51 & Table 40). Business travellers had the largest average EF for built-up land (198 $gm^2$/person/day), but it was not significant (Fig. 52 & Table 41). VFR travellers' EF for built-up land was significantly larger than education and 'other' travellers although VFR travellers' built-up EF was the second largest (137 $gm^2$/person/day) of five segments.

**Fig. 46 The average daily EF with standard error of Japanese tourists by purpose of visit (Holiday: n = 35, Business: n = 9, VFR: n = 11, Education: n = 6, and Other: n = 9).**

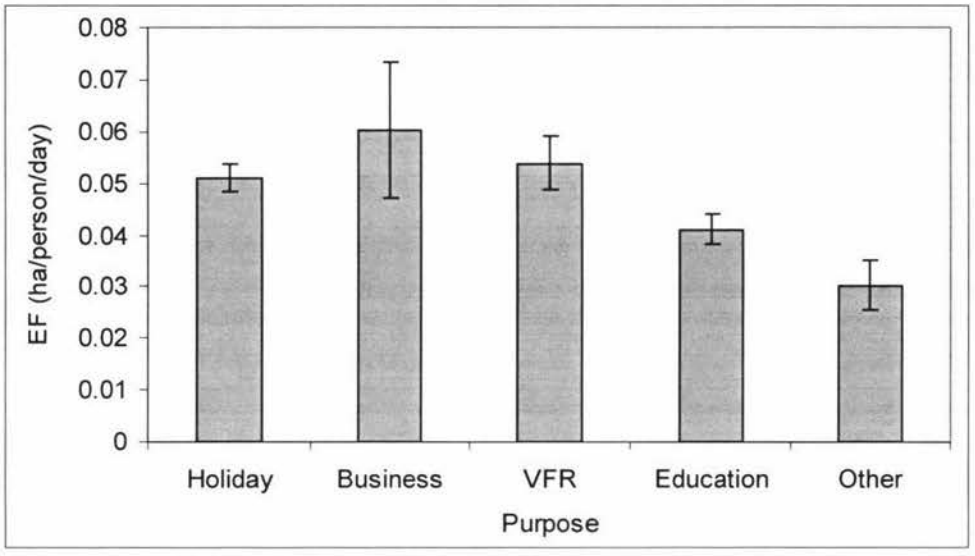



**Table 35 T-test (n = 69) results (P - values) for each purpose of visit (significant P-values in bold).**

| | Business | VFR | Education | Other |
|---|---|---|---|---|
| Holiday | 0.506 | 0.637 | **0.024** | **0.002** |
| Business | | 0.656 | 0.186 | 0.057 |
| VFR | | | **0.049** | **0.004** |
| Education | | | | 0.080 |

**Fig. 47 The average daily EF of Japanese tourists with standard error for housing category by purpose of visit.**

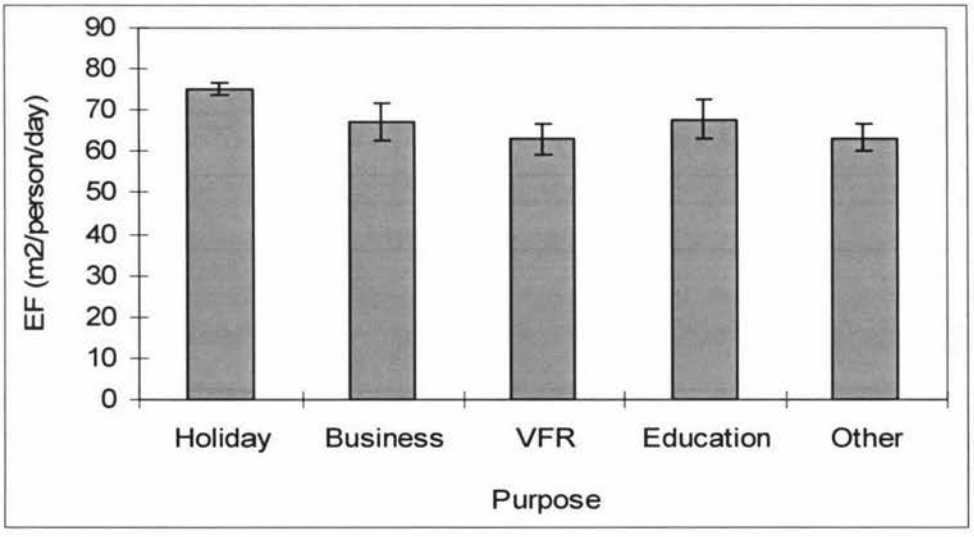


**Table 36 T-test (n = 69) results (P - values) for housing category by each purpose of visit (significant P-values in bold).**

| | Business | VFR | Education | Other |
|---|---|---|---|---|
| Holiday | 0.115 | **0.012** | 0.189 | **0.005** |
| Business | | 0.472 | 0.920 | 0.474 |
| VFR | | | 0.432 | 0.943 |
| Education | | | | 0.435 |

**Fig. 48 The average daily EF of Japanese tourists with standard error for transportation category by purpose of visit.**

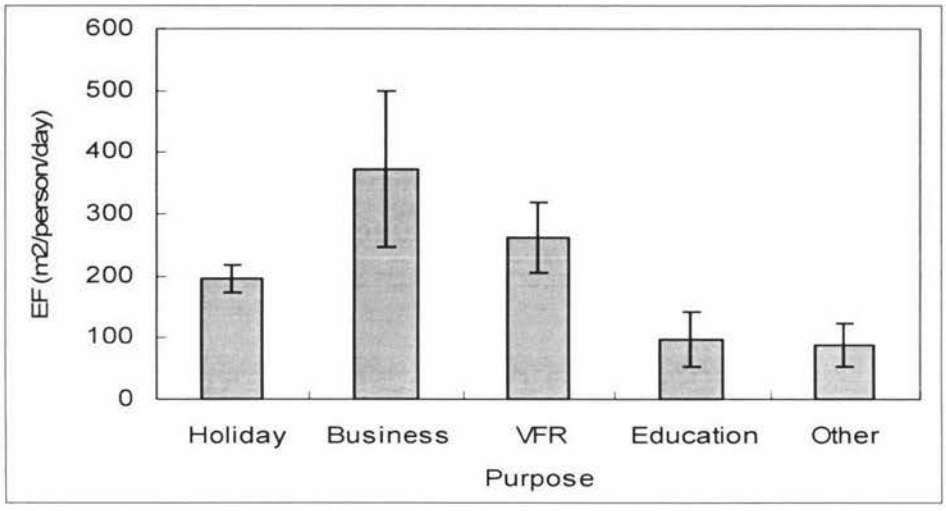



**Table 37 T-test (n = 69) results (P - values) for transportation category by each purpose of visit (significant P-values in bold).**

| | Business | VFR | Education | Other |
|---|---|---|---|---|
| Holiday | 0.203 | 0.308 | 0.077 | **0.019** |
| Business | | 0.446 | 0.067 | 0.058 |
| VFR | | | **0.038** | **0.020** |
| Education | | | | 0.866 |

**Fig. 49 The average daily EF of Japanese tourists with standard error for goods category by purpose of visit.**

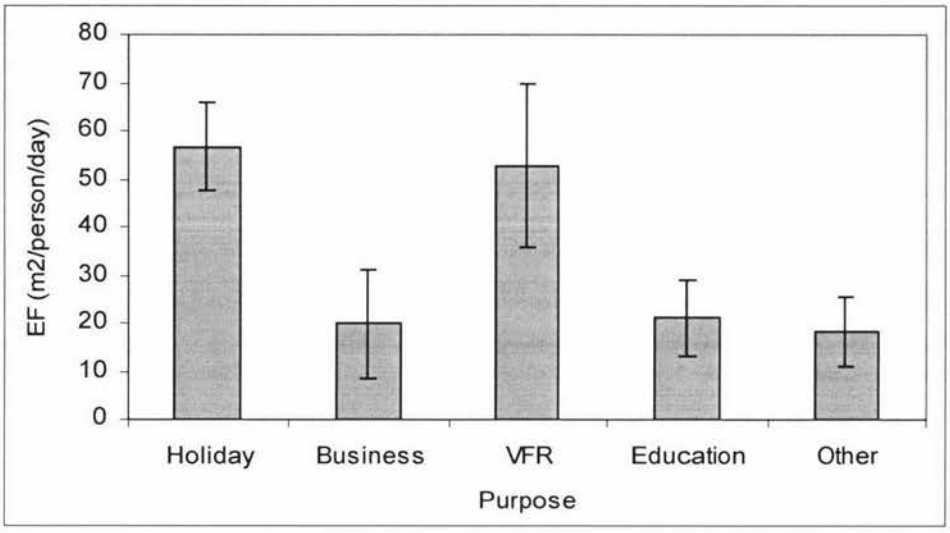



**Table 38 T-test (n = 69) results (P - values) for goods category by each purpose of visit (significant P-values in bold).**

| | Business | VFR | Education | Other |
|---|---|---|---|---|
| Holiday | **0.020** | 0.840 | **0.008** | **0.003** |
| Business | | 0.126 | 0.934 | 0.897 |
| VFR | | | 0.113 | 0.084 |
| Education | | | | 0.790 |

**Fig. 50 The average daily EF of Japanese tourists with standard error for services category by purpose of visit.**

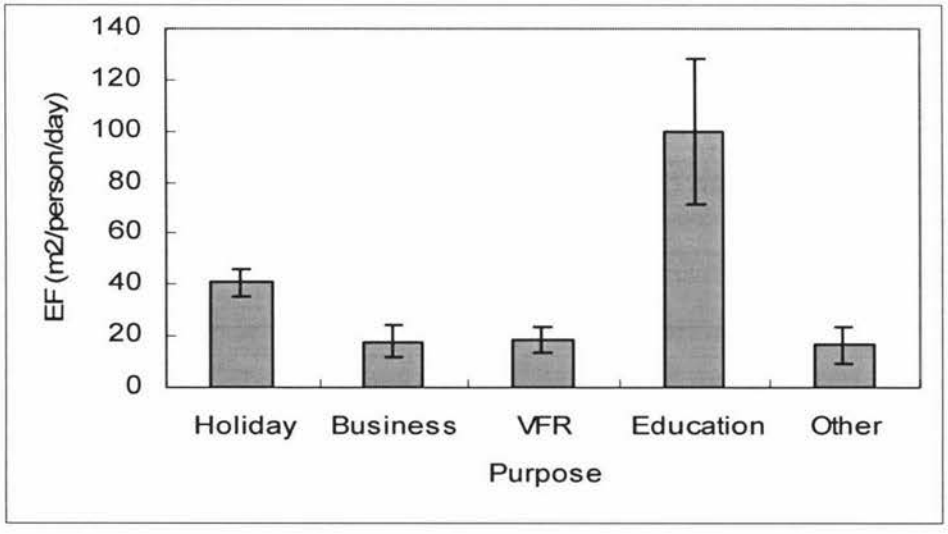


**Table 39 T-test (n = 69) results (P - values) for services category by each purpose of visit (significant P-values in bold).**

| | Business | VFR | Education | Other |
|---|---|---|---|---|
| Holiday | **0.011** | **0.004** | 0.099 | **0.015** |
| Business | | 0.956 | **0.038** | 0.896 |
| VFR | | | **0.038** | 0.847 |
| Education | | | | **0.030** |

**Fig. 51 The average daily EF of Japanese tourists with standard error for energy footprint by purpose of visit.**

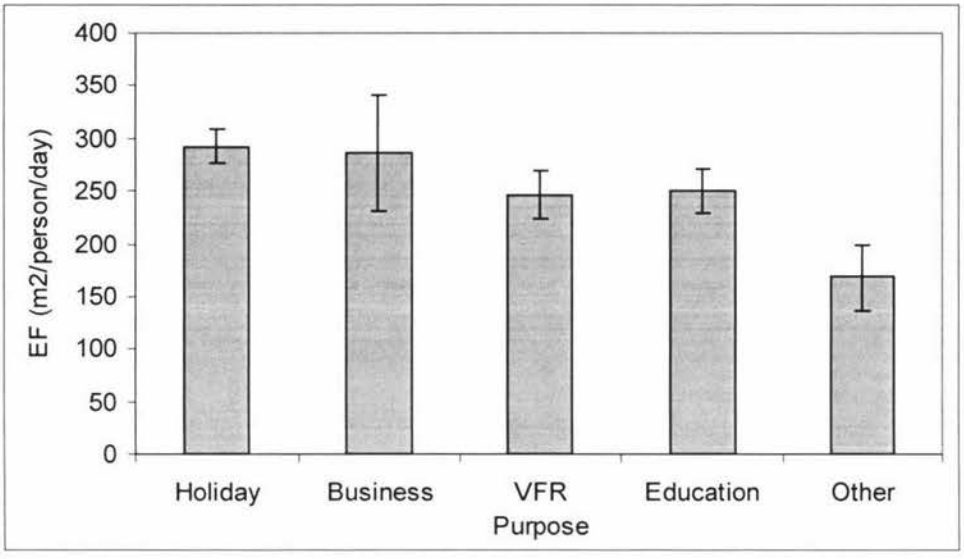



**Table 40 T-test (n = 69) results (P - values) for energy footprint by each purpose of visit (significant P-values in bold).**

| | Business | VFR | Education | Other |
|---|---|---|---|---|
| Holiday | 0.911 | 0.120 | 0.150 | **0.004** |
| Business | | 0.514 | 0.564 | 0.089 |
| VFR | | | 0.875 | 0.070 |
| Education | | | | **0.051** |

**Fig. 52 The average daily EF of Japanese tourists with standard error for built-up land by purpose of visit.**

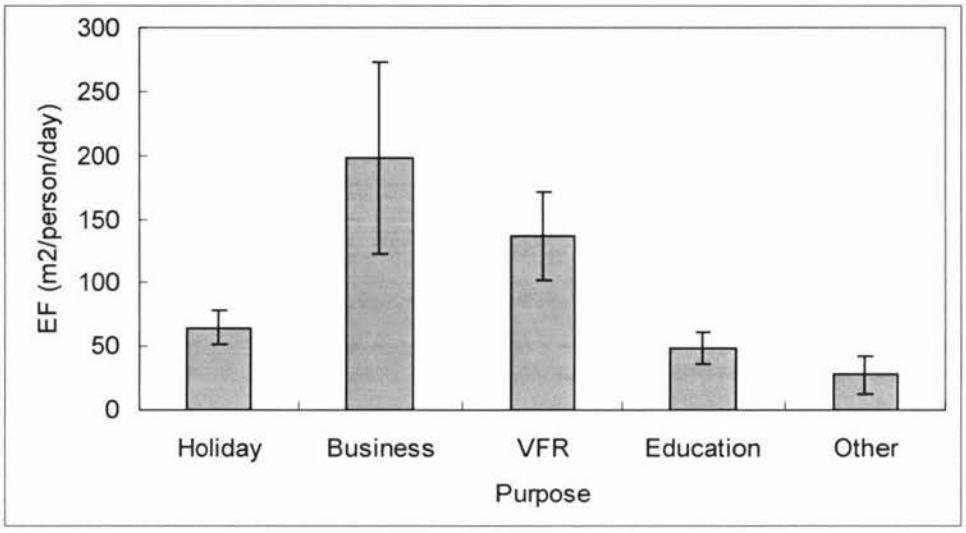



**Table 41 T-test (n = 69) results (P - values) for built-up land by each purpose of visit (significant P-values in bold).**

| | Business | VFR | Education | Other |
|---|---|---|---|---|
| Holiday | 0.121 | 0.072 | 0.374 | 0.071 |
| Business | | 0.481 | 0.088 | **0.054** |
| VFR | | | **0.033** | **0.011** |
| Education | | | | 0.291 |

### *4.6.4.2 Travel Style and EF*

The average daily EFs were similar across four different travel styles (around 0.05 ha/person/day) and the t-tests (n = 69) did not indicate any difference among them. There was more variation in EF of FITs and SITs (Fig. 53). The median EFs varied from 0.038 $gm^2$/person/day for FIT to 0.050 $gm^2$/person/day for SIT.

The EF of each consumption category was again tested for each travel style. There were no significant differences for food, transportation, and services, while housing and goods categories indicated the some significant differences. The average housing EFs of SITs and FITs were significantly smaller (66 $gm^2$/person/day and 61 $gm^2$/person/day respectively) than escorted and package travellers (74 $gm^2$/person/day and 77 $gm^2$/person/day respectively) (Fig. 54 & Table 42). However, the housing footprint was only small portion of the overall EF (18 %). For goods EFs, package

travellers had the largest average EF (73 $gm^2$/person/day) and it was significantly larger than SITs and FITs (23 $gm^2$/person/day and 27 $gm^2$/person/day respectively) (Fig. 55 & Table 43). Escorted travellers also had larger average goods footprint (52 $gm^2$/person/day) than FITs. Although goods category showed some statistically significant differences, it occupied only six % of EF.

The EFs for fossil energy land and built-up land were also tested with each travel style and was examined using t-tests (n = 69). The average energy footprint of escorted travellers was the largest (285 $gm^2$/person/day) and FITs had the smallest energy footprint (239 $gm^2$/person/day) (Fig. 56). However, these differences were not statistically significant. EF for built-up land showed a reverse trend compared to energy footprints; namely escorted travellers had the smallest (46 $gm^2$) and FITs had the largest (147 $gm^2$). Though, only EF of SITs showed a statistically significant difference for built-up land, and was larger than escorted and package travellers (Fig. 57 & Table 44).

**Fig. 53 The average daily EF of Japanese tourists with standard error by travel style (Escorted; n = 28, Package; n = 11, SIT: n = 18, and FIT: n = 13).**

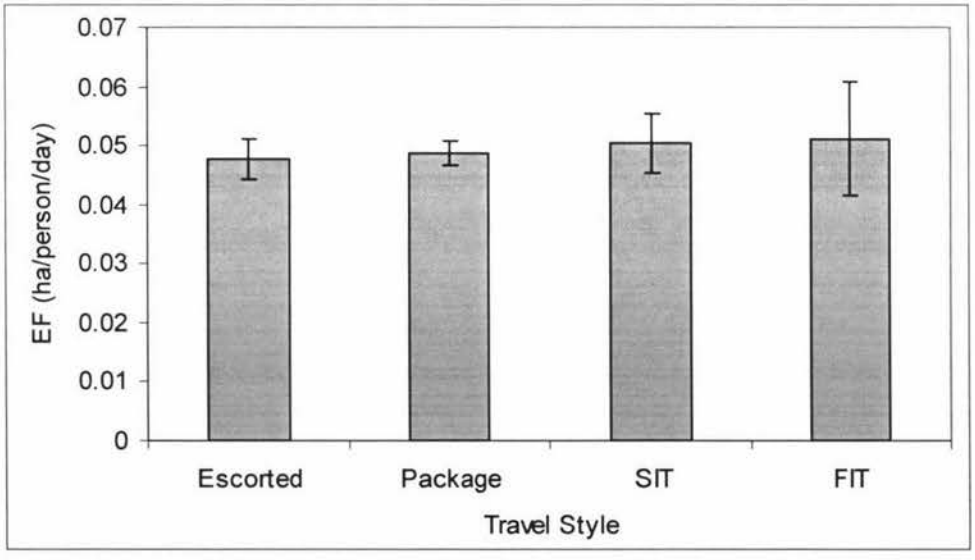


**Fig. 54 The average daily EF of Japanese tourists with standard error for housing category by travel style.**

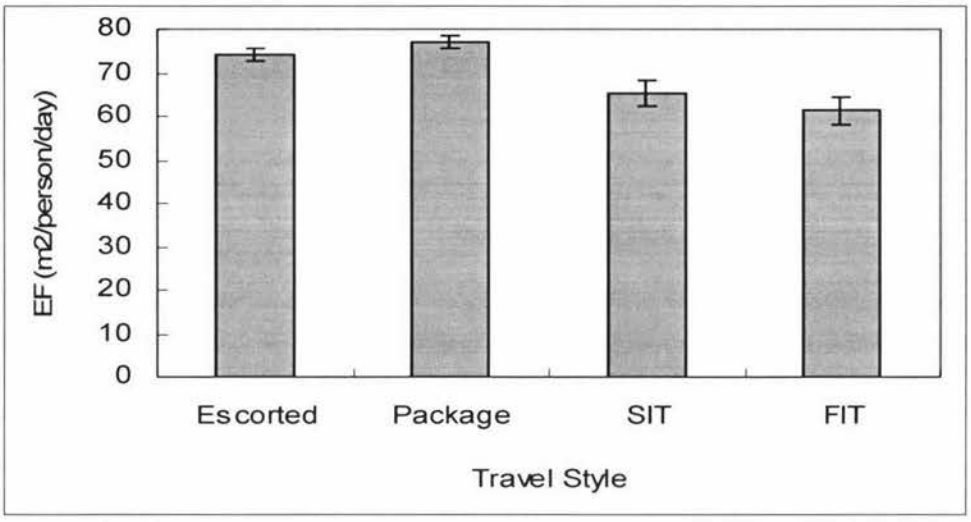



**Table 42 T-test (n = 69) results (P - values) for housing category by travel style (significant P-values in bold).**

| | Package | SIT | FIT |
|---|---|---|---|
| Escorted | 0.172 | **0.016** | **0.002** |
| Package | | **0.001** | **0.000** |
| SIT | | | 0.330 |

**Fig. 55 The average daily EF of Japanese tourists with standard error for goods category by travel style.**

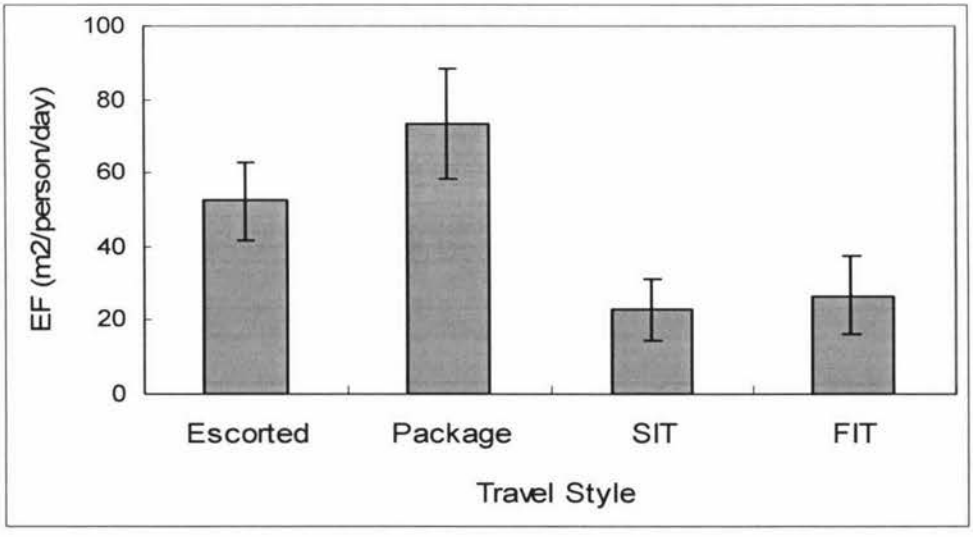


**Table 43 T-test (n = 69) results (P - values) for goods category by travel style (significant P-values in bold).**

| | Package | SIT | FIT |
|---|---|---|---|
| Escorted | 0.264 | **0.035** | 0.094 |
| Package | | **0.010** | **0.020** |
| SIT | | | 0.779 |

**Fig. 56 The average daily EF of Japanese tourists with standard error for fossil energy land by travel style.**

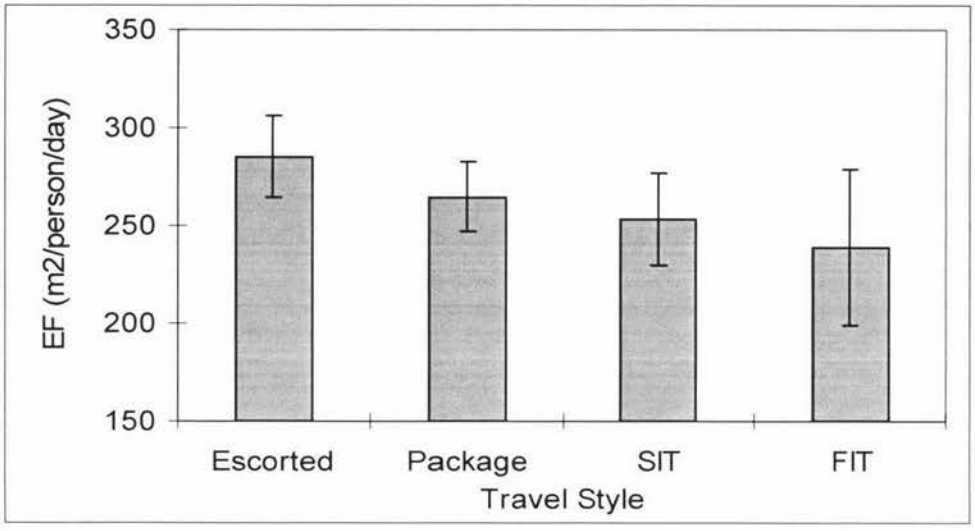



**Fig. 57 The average daily EF of Japanese tourists with standard error for built-up land by travel style.**

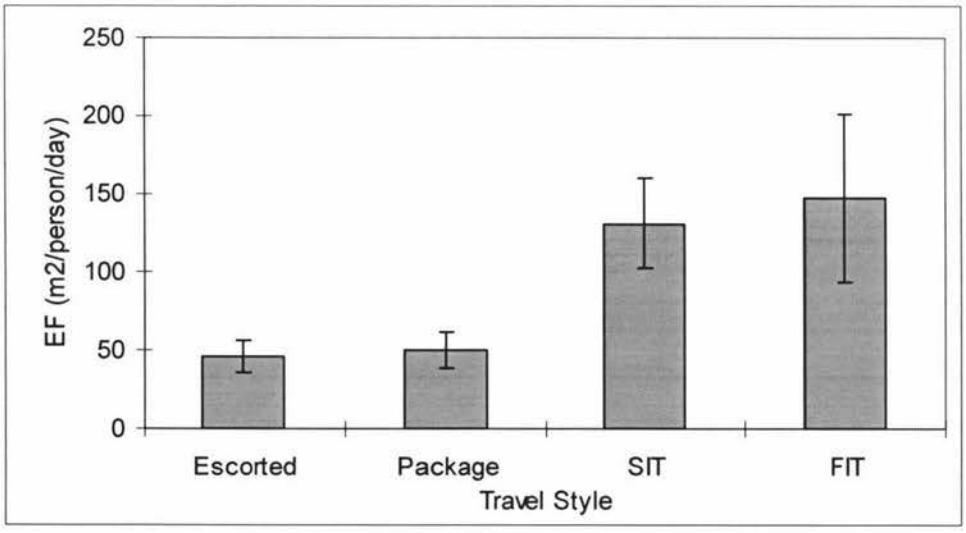


**Table 44 T-test (n = 69) results (P - values) for built-up land by travel style (significant P-values in bold).**

| | Package | SIT | FIT |
|---|---|---|---|
| Escorted | 0.820 | **0.011** | 0.089 |
| Package | | **0.015** | 0.101 |
| SIT | | | 0.793 |

### *4.6.4.3 EF by Gender*

The average EF was larger for male travellers (563 $gm^2$/day) than female travellers (451 $gm^2$/day) (Fig. 58), though the t-test did not indicate significant difference between the gender (P = 0.074). The median was also larger for males (507 $gm^2$/day) than females (418 $gm^2$/day).

The average EFs of males and females were also tested for two main consumption categories (housing and transportation) and for two main land types (fossil energy land and built-up land) to see if there were any differences between the genders. The average housing EFs were almost identical between male and female travellers. Other three categories showed that male travellers had larger average EFs, while none of t-tests indicated significant differences. However, P-value of both transportation EF and EF for built-up land showed almost significant differences (both P- value was 0.054) (Fig. 59).

**Fig. 58 Average EFs with standard error for male (n = 24) and female (n = 45) Japanese travellers.**

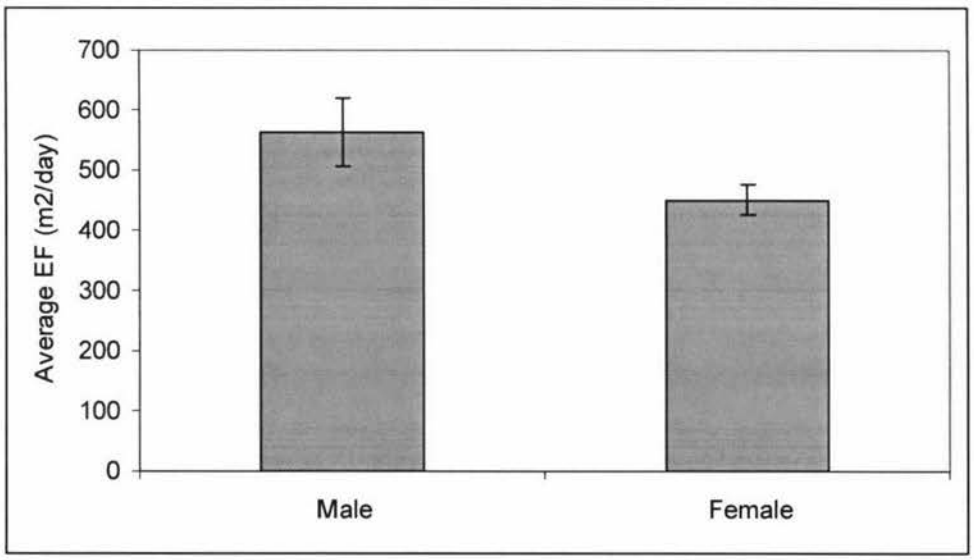
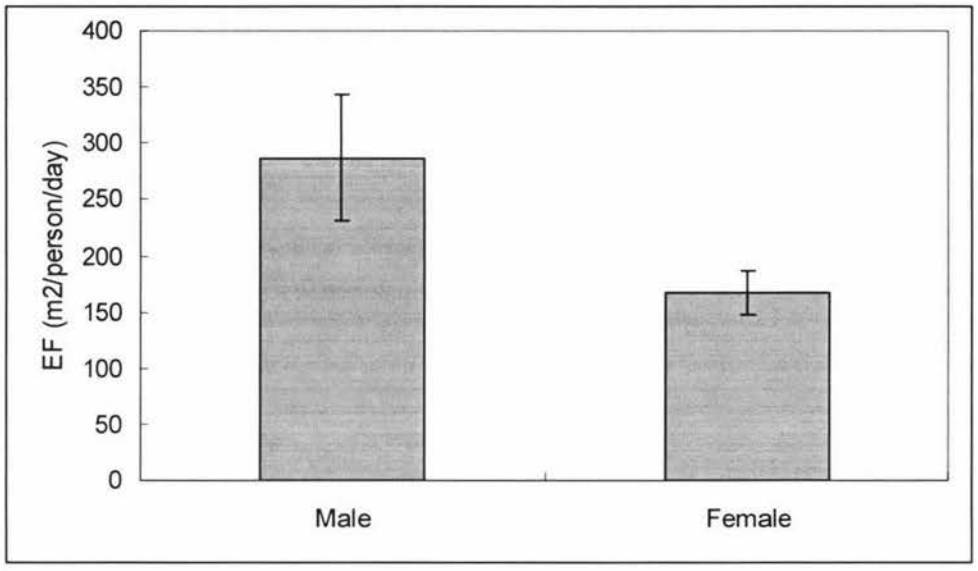


**Fig. 59 Average transportation EFs with standard error for male (n = 24) and female (n = 45) Japanese travellers.**




### *4.6.4.4 EF by Age Group*

The daily EFs of individual travellers were plotted and examined using regression analysis. The EF seemed to increase with age progress, but the $R^2$ value was quite small (0.1187) (Fig. 60).

Individual daily EFs for two consumption categories (housing and transportation) and for two land types (fossil energy land and built-up land) were examined with their age group using regression analysis. All four categories showed general increasing trend with the age. Transport footprint seemed to increase with age progress, that is, the older travellers tend to have larger transport footprint, but $R^2$ value was very low (Fig. 61). Energy footprint also showed an increase trend with the age (Fig. 62).

**Fig. 60 The individual EFs of Japanese tourists by age group (10 = <19, 20 = 20s, 30 = 30s, 40 = 40s, 50 = 50s, 60 = 60s, 70 = >70) (n = 69).**

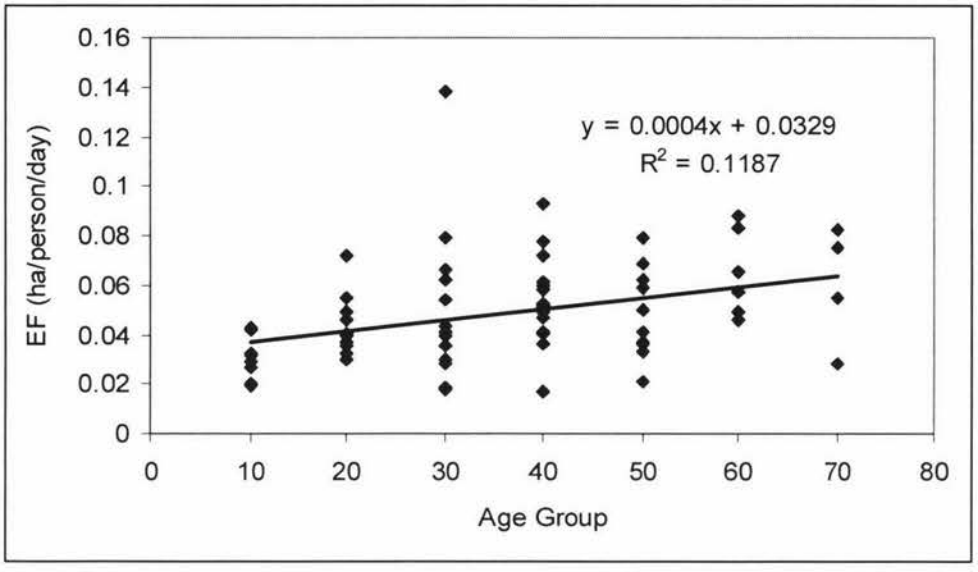



**Fig. 61 The individual transportation footprints of Japanese tourists by age group (10 = <19, 20 = 20s, 30 = 30s, 40 = 40s, 50 = 50s, 60 = 60s, 70 = >70) (n = 69).**

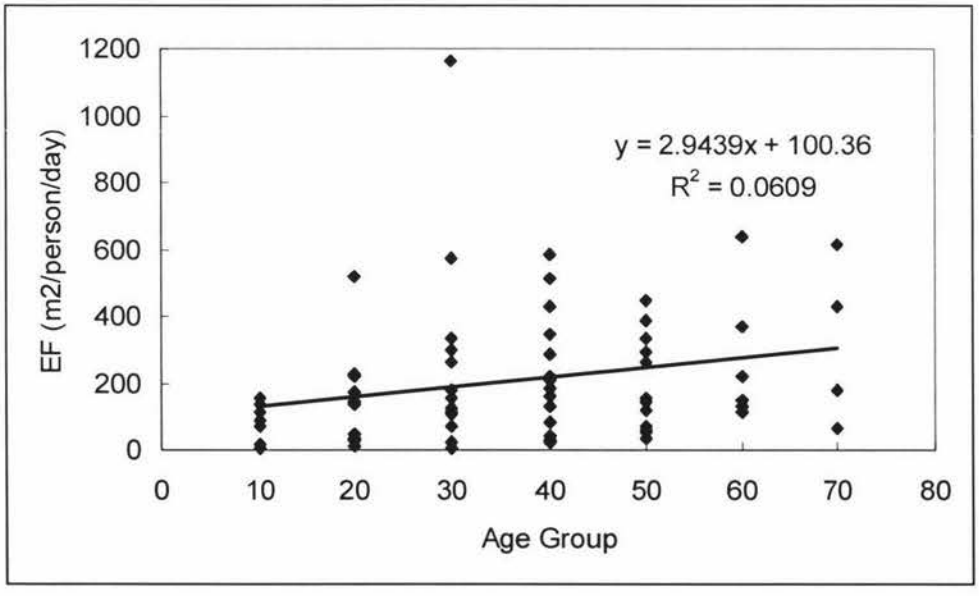
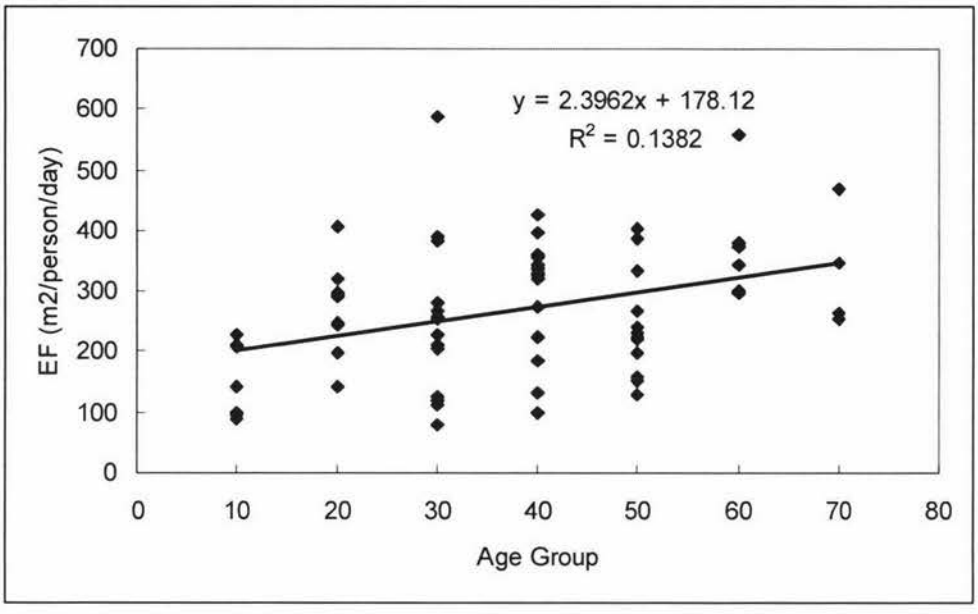


**Fig. 62 The individual energy footprints of Japanese tourists by age group (10 = <19, 20 = 20s, 30 = 30s, 40 = 40s, 50 = 50s, 60 = 60s, 70 = >70) (n = 69).**




### *4.6.4.5 EF by Length of Stay*

The regression analysis of the daily EF of travellers indicated that there was no tendency of their daily EF would be smaller if they stay longer (Fig. 63). The result was largely skewed by three travellers who stayed over 100 days. Each consumption category (food, housing, transportation, goods and services) and land type (fossil energy land, cropland, pasture, forest and built-up land) were also tested to see any trend with length of stay. Although most categories appeared to be decreasing with the length of stay increases (Fig. 64, and 65), there were no statistically significant trends, but the results were skewed by some outliers.

**Fig. 63 The individual EFs by length of stay for Japanese travellers who stayed less than 30 days (n = 67).**

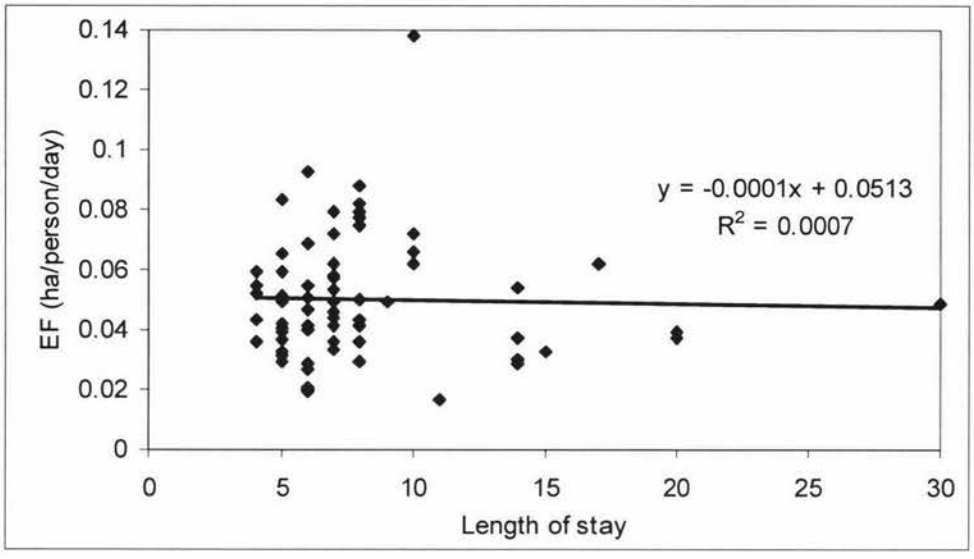



**Fig. 64 The individual housing footprints by length of stay for Japanese travellers who stayed less than 30 days (n = 67).**

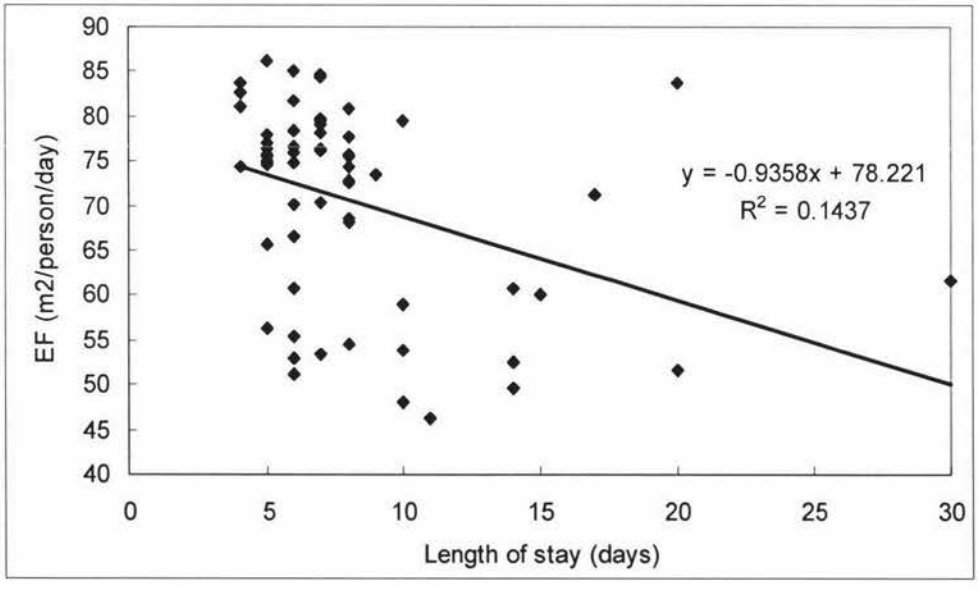
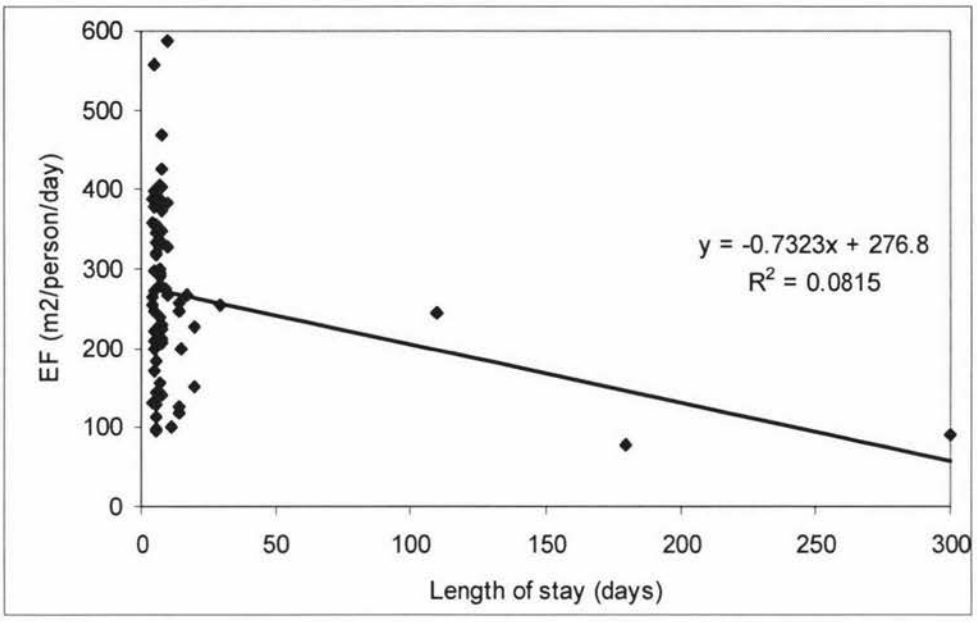


**Fig. 65 The individual energy footprints of Japanese tourists by length of stay (n = 70).**




### 4.6.5 General Comparisons of EFs

The available biocapacity of New Zealand is 0.0379 gha/person/day, while the average daily EF of Japanese tourists was 0.0490 gha/person (without international flights), which indicates the ecological deficit of 0.011 gha/traveller/day. This daily EF is equivalent to annual EF of 18 gha/traveller/year. Once international flights were included, the average daily EF would increase to 0.090 gha/traveller/day, which indicated even larger impacts.

The average daily EF of Japanese travellers was considerably larger than any resident EFs of New Zealand, Japan or the global average (Table 45). In particular, EF of energy land, cropland, and built-up land were notably larger than the resident EFs. The distribution of EF was, however, relatively similar as energy land was still the major component of the EF. The obvious difference in the component of EFs between residents' and travellers' EF was the built-up land. The travellers' EF of built-up land was the second largest element of the EF while built-up land was the smallest for the residents' EF.

Comparisons by consumption category with EF of New Zealand residents

showed that EF of Japanese travellers was larger in every component (Table 46). The size of EF for food was 1.6 times larger and goods were about double of that of residents, while transport footprint was over 50 times, housing energy was 14 times and service was four times larger than the New Zealand residents' average daily footprints.

Only four Japanese travellers (out of 70) had a daily EF less than 200 $gm^2$ that were similar to the EF of New Zealand resident and 25 travellers were below the biocapacity of New Zealand. The smallest EF of the Japanese traveller was 168 $gm^2$, which meant that none of the Japanese travellers however had EF smaller than the average New Zealand resident EFs (151 $gm^2$/person/day) and their EF was much larger than global biocapacity (49 $gm^2$/person/day).

**Table 45 Daily EF of resident in New Zealand, Japan, and the world compared with the Japanese travellers in New Zealand (global $m^2$/person/day) (Loh & Wackernagel, 2004).**

| | New Zealand | Japan | World | Japanese travellers |
|---|---|---|---|---|
| Energy land | 36 | 77 | 33 | 265 |
| Cropland | 17 | 13 | 13 | 49 |
| Pasture | 29 | 2 | 4 | 13 |
| Forest | 40 | 9 | 5 | 52 |
| Built-up | 4 | 2 | 2 | 87 |
| Fishing | 24 | 15 | 4 | 23 |
| Total | 151 | 118 | 60 | 490 |

**Table 46 Daily EF of New Zealand resident and Japanese travellers in New Zealand by consumption category (global $m^2$/person/ day) (Ministry for the Environment, 2005).**

| | New Zealand | Japanese travellers |
|---|---|---|
| Food | 47 | 75 |
| Transport | 4 | 207 |
| Housing energy | 2 | 27 |
| Goods | 22 | 43 |
| Services | 9 | 36 |

# CHAPTER FIVE:

# *DISCUSSION*

## *5.1 Survey*

### 5.1.1 Overall Results

The sample size of the survey was small due to several limitations mentioned earlier, but the overall trends were reasonably similar (except demographics) with International Visitor Survey (IVS) and International Visitor Arrival (IVA), which verified my survey results. The differences between my survey results and IVS/IVA might be due to the seasonality and the small sample size. The main differences were:

- Age group: there were more middle-aged travellers in their 30s and 40s in my survey and less young and older age groups which were normally considered as target segments. The reason for less younger travellers (particularly those in the early 20s) was mainly for the seasonality, i.e., not the school holiday season. The higher proportion for the travellers in their 30s is likely to be caused by a larger proportion of business travellers in my survey. Indeed, many business travellers were in their 30s in my study.
- The greater proportion of female travellers in my study.

Background information obtained from my survey supported general observations about Japanese travellers, namely:

- Many Japanese travellers prefer travelling as package/ group travellers (Gnoth, 2003; Oyamada, 1982);
- Japanese are less likely to be Free Independent Travellers (FITs) (Ministry of Tourism, 2005a). In comparison, over half of all international travellers are FITs (Ministry of Tourism, 2005b);
- The majority of Japanese travellers stayed for a short time in New Zealand (less than eight days) as pointed in other studies such as World Tourism Organisation

(2000);

- The educational visitors stayed longer in both my survey and IVS, as noted in the report of Covec Limited (2004);
- Holiday travellers tend to stay in New Zealand for short periods; and
- The majority of tourists visited only the 'traditional' tourism destinations in New Zealand. Auckland is still the most popular destination for Japanese travellers, partially because it is the point of entry to New Zealand.

Becken (2003b) found that VFR tourists were very bound to gateway cities (Auckland and Christchurch); whereas my study showed that Japanese VFR tourist were more regionally dispersed and tend to visit non-tourist destinations (apparently to see friends/relatives or their recommended areas).

### 5.1.2 Interesting Opinions from the Survey

Some Japanese travellers responded to the survey with a few interesting opinions about New Zealand. These views are related to future sustainable tourism development, some opinions are more towards social sustainability.

- A female teacher in her 50s felt that the behaviour of young Japanese tourists was unacceptable in New Zealand.
- A male traveller, in his 40s, encountered two very unpleasant racists while he was in New Zealand for 11 days. Some young New Zealanders yelled at him to not come to New Zealand because he is Asian. He felt that he would never come to New Zealand again. This type of experiences may become more common than before, partially since Asian population in New Zealand and the number of Asian tourists increase. This illustrated one negative social impact of tourism. He is also a freelance researcher in landscape, and he noticed a large scale deforestation sites near Taupo and felt that it is a myth that New Zealand is 'Clean and Green' country.
- A female FIT in her 30s realised that the rubbish was not separated for recycling

in the fast-food shops (c.f., rubbish separations are almost compulsory and very common practice in Japan). Also she saw many old diesel vehicles in New Zealand (the diesel vehicles are believe to be harmful to the environment in Japan). She felt that New Zealanders did not care about environmental issues.

## *5.2 Ecological Sustainability of Japanese Tourism*

### 5.2.1 Overall Ecological Deficit

The large EFs of Japanese tourists reflect their ecological unsustainability; because the Japanese travellers were consuming resources at unsustainable rate. This indicated that the New Zealand tourism industry relied on ecological hinterland or there might have been some damages caused as results of tourism activities. This EFA was conservative because it excluded the impacts caused in other countries (the resource consumption, production, and transportation of products) and international flights. If this analysis included these hidden costs in overseas, the size of EF would be much larger. This meant that the actual impacts would be far from ecologically sustainable. New Zealand has a considerably larger biocapacity available for human activities, yet it may not be enough to support Japanese travellers. The average daily EF of Japanese travellers was 10 times larger than the bioproductivity of the earth even without considering international flights which could generate up to 70 % of all tourism-related $CO_2$ emissions (Patterson & McDonald, 2004) and many other indirect resource consumptions. Only 25 out of 70 travellers had smaller daily EF than New Zealand biocapacity.

The energy land, built-up land and cropland of EF were particularly larger compared to the residents' EFs of New Zealand, Japan and the global average. This indicates that global warming, loss of productivities and habitat degradation may be the likely impacts caused by Japanese tourists. For consumption categories, transportation contributed to the largest proportion of the total EF, followed by food and housing. However, the detailed comparisons of average daily EF between New Zealand residents and Japanese travellers for consumption pattern showed that transport, housing and services were making the EF of travellers much larger than that of its residents.

### 5.2.2 Energy Consumption

Energy land is a major part of tourists' EF, and the daily energy footprint was far larger than that of New Zealand residents. Even though a large proportion of electricity consumption was not translated into energy land in New Zealand due to renewable electricity sources, the average daily energy footprint of Japanese tourists was still markedly large; over seven times larger than that of New Zealand residents and more than three times larger than that of Japanese residents. The average international tourist causes the emission of about 263 kg of $CO_2$ per trip for their holiday within New Zealand and 1190 kg of $CO_2$ for their one-way travel to New Zealand (Becken, 2004). This high level of $CO_2$ emissions may be contributing to the global warming. An average Japanese traveller may have a larger energy footprint than other tourists, even though Japanese travellers stay in New Zealand for shorter periods than many other travellers. This suggests that Japanese travellers are more energy intensive than other international travellers. Another study suggested that the total energy consumption of an average international tourist in New Zealand was four times that of a domestic tourist (Becken, Simmons *et al.*, 2003a). This may mean that Japanese travellers are one of the most energy intensive travellers of all.

The average contribution of transport to the total energy footprint was relatively small for Japanese travellers compared to other international tourists (65 %) and New Zealand domestic tourists (73 %) (Becken, Simmons *et al.*, 2003a). This could be because Japanese travellers consume more energy for other consumption categories, such as for accommodation, meals, and activities and also partly because of the use of energy efficient transportation methods (i.e., coaches).

#### *5.2.2.1 Accommodation/housing*

Accommodation is normally regarded as one of the main energy consumers in the tourism industry. Although the accommodation sector mainly consumes electricity (Becken & Cavanagh, 2003) and thus may not result in a large energy footprint, EF of Japanese tourists in the accommodation/housing sector had about four times the energy footprint of the average New Zealand resident. This was mainly due to the large proportion of Japanese travellers staying in hotels which were the most energy

intensive accommodation type (Becken, 2000; Becken *et al.*, 2001). The average per capita energy consumption in a New Zealand household was 40.8 MJ per night (EECA, 2000), which was less than one third of that in hotels (155 MJ/visitor night) (Becken *et al.*, 2001). Japanese travellers are most likely to stay in hotels compared to other international travellers in New Zealand (Ministry of Tourism, 2005a, 2005b). This alone could indicate larger energy footprint of Japanese travellers compared to other international visitors.

In terms of the annual visitor nights, farm/home-stays were the most frequently used accommodation type for Japanese. Becken *et al.* (2001) also pointed that farm/home-stays were another energy intensive accommodation, requiring 110 MJ/visitor night. Frequent use of hotels and farm/home-stays (i.e., the two most energy intensive accommodation types) resulted in the large energy footprint of Japanese tourists in accommodation/housing category. On the contrary, the most frequently used accommodation types (in terms of visitor nights) by all international tourists in New Zealand were private home of friend/relatives and backpackers/YHA (Ministry of Tourism, 2005b), both of which required less than one third of hotels and farm/home-stays (Becken *et al.*, 2001). Japanese travellers who stayed in backpackers/ YHA had smaller daily housing/accommodation EFs and also smaller overall daily footprints.

In addition, many Japanese travellers prefer cooked meals (particularly in restaurant), which require a large amount of energy. As illustrated by Aebischer *et al.* (2003), hot meals were generally more energy intensive than cold meals and could require up to 3kWh/meal for preparation and cooking (excluding production and transport).

#### *5.2.2.2 Services/activities*

The daily EF of Japanese tourists for services was also larger than New Zealand residents' footprints. Services required 20 % of the total energy footprint, four times larger than that of New Zealand residents. The service sector included the tourism activities and attractions. Some Japanese tourists undertook energy intensive activities such as jet boating and scenic flights. IVS showed that approximately 10 % of Japanese travellers undertook jet boating and scenic flights. In particular, scenic flights were more popular among Japanese and only five percent of total international

travellers undertook scenic flights in New Zealand (Ministry of Tourism, 2005a, 2005b). Wackernagel *et al.* (2003) estimated the energy requirement for education to be 3 MJ per dollar spent. As a consequence, education required considerable energy and regarded as another energy intensive activity; therefore the average service footprint of educational visitors was much larger than other visitors.

In order to reduce energy consumption, tourists could participate in the activities with less energy intensity or visit attractions, since tourist activities are generally more energy intensive than attractions (Becken & Simmons, 2002). Cultural attractions normally require less energy and are less subject to increasing energy use (Becken & Simmons, 2002). However, it is difficult to restrict these energy intensive activities as they are more expensive and potentially more profitable. They are also likely to be the highlights of the trip for the tourists. Education is also a key tourism sector as it attracts many international visitors who spend a large amount of money here. Thus, energy intensive activities can be important for the industry itself.

### 5.2.3 Transport Footprint

Transport was the largest energy consumers in the tourism industry and the daily transport footprint of an average Japanese tourist was 50 times larger than that of a New Zealand resident. Mobility is essential to tourists and all forms of tourists utilise some form of transportation (Black, 2004); hence it is reasonable to expect larger transport footprint. However, the difference was significant and need consideration.

Domestic air travel and coaches were the two most popular transportation methods for Japanese tourists. All segments of Japanese tourists used domestic air travel but the road transportation methods varied depending on the travel purposes and styles. Holiday tourists were most likely to use coaches, which are one of the most energy efficient transportation methods mainly due to the high occupancy rate (Becken, 2002); while business and VFR travellers commonly used cars/vans. Swarbrooke (1999) noted that business tourist generally involves travel with private (including rental) vehicles rather than public transport, thus demand more fuel and cause more pollution. Educational travellers were least likely to travel a long distance

since their main purpose was to study, not the travelling or sightseeing. They typically stay in one or few places and may travel somewhere else during their school holidays. Therefore, their daily travel distance might be the shortest. These facts resulted in business travellers having the largest average transport footprint, followed by VFR and holiday travellers. Educational and school excursion travellers had smaller average daily transport footprints.

In North America and most European countries, the car is the major form of transport for tourism, and there is a growing realisation of negative impacts from driving cars (Lumsdon & Tolley, 2004). Impacts of driving cars include emissions of $CO_2$ and other pollutants, noise, congestion and illegal parking that may reduce the quality of the visitor environment (Lumsdon & Owen, 2004). Since most Japanese tourists use coaches or rent vehicles (mostly petrol cars), and are least likely to drive campervans, their transport footprint may be smaller than the tourists from other countries (particularly from Western countries).

The likely reasons for Japanese travellers to use coaches rather than driving cars are:

- They travel in groups (including escorted tours); and
- They are not familiar with driving vehicles overseas, partly due to their poor English language ability and lack of familiarity with overseas road systems.

If the second explanation is correct, there would be more self-driving Japanese tourists in the future, as they become more confident with travelling abroad. This means that the size of transport footprint may increase in the future.

Of the 70 Japanese tourists in this study, only two tourists had daily transport footprint smaller than 10 $gm^2$. Although their transport footprints were still larger than the average New Zealand daily transport footprint (two $gm^2$) (Ministry for the Environment, 2005), their transport footprints were much smaller than other tourists. Both travellers stayed New Zealand over six months and travelled long distance (approx. 1000 km) by coaches. This suggests the potential of the transport footprint to be small by staying longer and using energy efficient transportation methods. By contrast, the largest individual daily transport footprint (1165 $gm^2$) was recorded by a traveller who drove a car for a long distance (4,800 km) in 10 days.

Mobility is the main requirement of all travellers; hence it is challenging to reduce the actual travel distance. From the study of Becken and Gnoth (2004),

international visitors commonly travel a long distance during their visit to New Zealand (Table 47). However, the average length of stay of other international travellers was longer than the Japanese travellers. This means that their daily EF may be smaller as they take longer time to travel. In order to reduce the daily energy consumption without reducing the travel distance, the travellers could choose the energy efficient transport methods (such as coaches) or travel slower by spending more time at each destination. Campervans are the most energy intensive road transportation, although they are energy efficient as accommodation.

**Table 47 Travel choice within the transport and accommodation sub-sectors that characterise international tourists in New Zealand (n = 4201) (Becken & Gnoth, 2004).**

| Transportation mode | Proportion of tourists (%) | Mean Usage (total km) |
|---|---|---|
| Domestic Air | 47.7 | 1039 |
| Coach Tour | 33.1 | 1131 |
| Rental car | 30.6 | 1646 |
| Cook Strait Ferries | 23.0 | 115 |
| Scheduled bus | 18.6 | 523 |
| Private car | 17.8 | 1053 |
| Train | 6.7 | 530 |
| Camper van | 5.2 | 2525 |
| Backpacker bus | 4.5 | 1504 |
| Other ferries | 1.3 | 94 |
| Hitchhiking | 1.2 | 908 |
| Motorcycle | 0.2 | 2104 |
| Bicycle | 0.3 | 1993 |

#### *5.2.3.1 Built-up land*

Energy consumption was not the only issue within transport footprint. The average Japanese tourists required 0.0846 ha of built-up land per visit, and 85 % of the built-up land was for transportation; namely the roading network. Built-up land is generally the smallest footprint in residents' EF (2 – 3 % of the total EF, or 2 - 4 $gm^2$/capita/day) (Loh & Wackernagel, 2004), while a Japanese tourist required 87 $gm^2$/day. Business and VFR travellers had larger built-up land footprint, because of the travel distance and transport method used. According to McDonald and Patterson

(2003), the total land used for the tourism transport sub-sector was 8,586 ha, which equates to the average built-up land of 39.4 $m^2$/ tourist trip or 1.75 $m^2$/visitor night. The average size of transport built-up land for Japanese tourist was 74 $gm^2$/tourist/day (or 23 $m^2$/tourist/day without equivalence factor). This much larger transport built-up land area was perhaps because of longer distance travelled during a shorter stay. The study by Becken *et al.* (2003b) showed that coach tourists normally travelled the longest distance (203 km/day). Coach tourists were the largest proportion of Japanese travellers (in escorted package tour), which indicated that Japanese travellers travel a long distance per day.

In actual fact, built-up land could have the most severe impacts of all six land types in EFA because the productivity is permanently lost. One may argue that the infrastructure already exists and may not make much difference whether the tourists use it or not. Indeed, it may reduce the per capita EF if more people share the same infrastructure. However, the road and other infrastructure would not be built, widened or extended if not many people use it. Thus, large built-up land would still indicate larger impacts. In addition, the road network may contribute to habitat loss, road kill, and pollution, which may be affecting biodiversity.

In order to reduce transport footprint, the tourists and tourism industry could focus more on "destination stay" within New Zealand. The tour companies and governmental tourism organisations could promote destination stay rather than 'tour' that cover large distances, which have large footprint as suggested by Patterson and McDonald (2004).

#### *5.2.3.2 International flights*

This EFA did not consider the energy consumption by international flights. However, Patterson and McDonald (2004) compared the $CO_2$ emissions from international travel for various overseas origins and calculated that one Japanese visitor produces 1.2 tonnes of $CO_2$ per visit. Japanese visitors constituted the fourth largest emission level as a country (180 kilo-tonnes) in 1999 among the international visitors to New Zealand due to its high number (146,953 Japanese visitors) and distance to New Zealand (9,931 km one-way). According to Becken (2004), the average international tourist emits about 1,190 kg of $CO_2$ for their one-way travel to New Zealand. This is a considerable amount and needs to be considered for the future tourism development.

### 5.2.4 Goods

Japanese went shopping everywhere they visited. This was evident from the IVS, Waitomo-tour and the pilot study as the Japanese travellers spent a significant amount of money for souvenir shopping (average $852/person). For many socio-cultural reasons (see Literature Review chapter), many Japanese travellers buy a large quantity of souvenirs and this behaviour contributes to the large resource consumption in the goods category. As a result, the EF for goods was twice the size of that of New Zealand residents.

Holiday and VFR travellers had larger average daily goods footprints than others. The daily goods footprint of educational travellers was much smaller because they stayed longer in New Zealand. Business travellers were different from other segments in shopping behaviour. Not only did they purchase fewer products but they also purchased different products. For most segments, 'cosmetics/soap/hand-cream' was a popular category, while honey was the most popular for business travellers. Honey was included in food category, thus the goods footprint of business travellers became even smaller. Other reasons for fewer purchases by business travellers would be because:

- they did not have time for shopping;
- they did not feel obligated to buy souvenirs for others because they did not visit New Zealand for personal reasons; or
- they visit New Zealand so frequently that they did not buy souvenirs on every visit.

Cropland was the second largest land category within the goods category (after energy footprint); this was because of cotton and woollen products. Wool is one of the New Zealand speciality and popular among Japanese travellers. In the pilot study, 11 out of 14 travellers bought at least one woollen product, and one traveller even bought nine items.

In this study, some souvenir items are excluded from EFA since they are not manufactured in New Zealand. For instance, most liquor (except wine), cigarettes, perfume, jewelleries (except jade and paua), watches, lighters, and pens are imported. Even many of the souvenir items sold in souvenir shops (T-shirts and toys with New Zealand logos) are actually made in other countries (particularly in China) and

imported and sold as New Zealand souvenirs.

### 5.2.5 Food

The average daily food footprint of Japanese tourists was also larger than that of New Zealand residents, although the difference was small. However, the food footprint of Japanese residents is generally smaller than that in New Zealand becauseas Japanese diet is similar to that of a vegetarian, which require smaller energy and arable land (McDonald & Patterson, 2003). In terms of quantity, Japanese tend to eat smaller amounts compared to many western countries. As shown in Wackenagel *et al.* (2000), the per capita EF for food was considerably larger in New Zealand than in Japan. This indicates that the food footprints of Japanese travellers is much larger than that of Japanese residents; because the travellers usually eat out, are served a larger amount of food which may be wasted. Also this food footprint included the food purchased as gifts (e.g., biscuits, chocolate and honey). In particular, honey is a New Zealand specialty and used in many different products, and was the most popular items purchased among business travellers.

Another feature of Japanese diets is a large quantity of seafood consumption. According to the EFA performed by Wada (1999), the aquatic footprint was the second largest EF, after the energy land. This was due to their gourmet seafood consumption. Japan is one of the largest fish consumers in the world (Central Intelligence Agency, 2005). Some escorted package itineraries included a seafood dinner, while the Japanese seemed to prefer eating meat (beef and lamb in particular) in New Zealand since they are 'curious gourmets' (Nishiyama, 1996) and enjoy tasting regional speciality. During the Japanese Waitomo full-day tour, more Japanese chose steak over fish and the chef from the restaurant also confirmed that beef steak was usually more popular than fish. This indicates that the Japanese travellers consume less seafood in New Zealand.

Japanese travellers still consume Japanese (or Asian) meals in New Zealand, which may result in a large footprint. This study did not calculate the precise energy requirement for food transport, while it potentially makes a considerable difference in

energy footprint within food category. Traditionally, Japanese eat a cooked breakfast. Some popular hotels among Japanese travellers (especially those in package tours) even prepare a Japanese breakfast menu. These menus must have larger energy requirements for transport as the ingredients are imported from other countries. This extra energy would have to be considered to assess the true impacts of Japanese tourists.

### 5.2.6 Water

Direct and indirect water inputs to the tourism sector was estimated to be 101,131,000 $m^3$ by McDonald and Patterson (2004), and the total international visitor nights was 49,115,754 in the year ended March 2005 (IVS). Assuming the water consumption was same for the year ended March 2005, this equated that the amount of water input was 2.06 $m^3$/visitor night. On the contrary, the average water consumption in New Zealand is 160 L (= 0.16 m3) per person/day (MYD 2004) and household water use in OECD countries ranges from 100 to 300 L/day/capita (OECD, 2001). Although Japanese usually use a bathtub almost everyday as well as taking a shower, the direct water use by Japanese travellers was not much different to New Zealand residents. The relatively small amount of water consumption by Japanese travellers could be due to less water consumption for laundry as only half of the travellers used laundry during the trip. This was possibly because many Japanese travellers stay only for a week. Also this water consumption did not consider any indirect water use.

Gossling (2001) investigated water usage in 28 hotels and guest houses in Zanzibar and average water consumption was 685 L/day/visitor, with a range from 100 - 2000 L/day/visitor, including watering the garden, which contributed about 50 %. Patterson and McDonald (2004) showed that water consumption by tourism sector was 373 L/visitor night in New Zealand. APEC (1996) found that water consumption rate was 378.5 L/visitor night in intensive accommodation.

## *5.3 Comparisons of Different Segments*

The ordination analysis did not reveal any clear differentiations among the different segments of tourists. The classification trees however, predicted some likely tendencies with the travel style, purposes of visit and their EFs. Also, the detailed statistical analysis showed some significant differences among the segments, indicating the different type of impact for each segment. This indicated that some behaviour of tourists (therefore the resource consumption patterns) could be predicted.

### 5.3.1 EF with Purposes of Visit

Some travellers were likely to have a greater impact than others. School excursion and educational travellers seemed to be more ecologically sustainable than others in this study. Also tourists from a different purpose of visit are expected to have different kinds of impacts. The following are the characteristics of each segment by their purpose of visit:

- Holiday: This category of travellers had largest housing footprint because the majority of tourists stayed in hotels, which consumed more energy. They also had the largest goods EF, as they commonly purchased more souvenir products than others. Most Japanese holiday tourists travelled by coaches and were similar to 'coach travellers' categorised by Becken *et al.* (2003b). Their study showed that coach travellers used more energy, consuming the largest amount of energy per day. They were more energy efficient in transport, but the extensive daily travel distance, stay at energy-intensive hotels, and the participation in energy-intensive activities (e.g., scenic flights and boat cruises) could explain their high energy usage. This was consistent with my findings. Holiday travellers also tended to stay for the shortest time.
- Business: The prominent characteristic of business travellers was their large EF in transportation. In addition, they might require heavy usage of energy for other purposes, such as large amounts of electricity for audiovisual aids used at conferences and computers used by those making individual business trips

(Swarbrooke, 1999). However, business travellers had the small EF in the goods and service category. Also, there was a large variation within the business segment and their length of stay and travel styles influenced the size of their EF.

- VFR: They had the smallest housing footprint because they frequently stay in the house of a friend or relatives, which were more energy efficient. However, their transport footprints were the second largest, because they commonly travelled by car. Their goods footprints were also one of the largest even though it was not statistically significant. Another study showed that the VFR travellers were relatively energy efficient mainly due to their longer stays, therefore shorter daily travel distances, and also because they stayed in accommodation using less energy (Becken, Simmons *et al.*, 2003b); however, they were not efficient travellers in my study. One probable reason was that Japanese VFR travellers did not stay long in New Zealand (average of 10 days).
- Education: The main feature of educational travellers was their large service footprint. However, their overall footprint was still small to medium as they had small footprints for other consumption categories. They also had noticeably smaller transport footprints. Furthermore, they tended to stay longer than other segments, which could make their daily footprints even smaller. Also, they tend to spend a large amount of money in New Zealand. Thus, educational travellers are more sustainable from both ecological and economical perspectives.
- School excursion: In general, school excursion travellers had small EFs. This might be because of their age as well as their travel style. They travelled in a large group, mostly by coach (with high occupancy rate), and they are too young to drive. Because of their age, they did not buy a large amount of souvenirs (less social obligation to buy souvenirs) and they were unlikely to buy expensive products. They were likely to have had meals within their accommodation while they stayed in home-stays (i.e., kiwi style home cooking including continental breakfast and cold/light lunch). The school excursion is unique compared with other traditional tourist segments. Their travel routes may be different since they are likely to have an education purpose. This school excursion group visited the Coromandel Peninsula. I also noticed another school excursion group visiting Palmerston North. These areas are not popular tourism destinations for many Japanese tourists.

### 5.3.2 EF with Travel Styles

The size of EFs was not clearly grouped by the travel style in the ordination or classification tree analysis. However, the detailed statistical analysis revealed some significant differences by travel styles in consumption categories. In fact, the tourists could be grouped into two travel styles by their consumption patterns; namely package travellers (both with and without escort) and independent travellers (both SIT and FIT).

Package travellers revealed larger footprints in housing and goods, while independent travellers had larger footprints in built-up land. Larger housing footprints of package travellers were due to their accommodation types, because all package travellers stayed in hotels. In addition, package deals frequently include cooked breakfasts that require more energy than continental/light meals. Those in package tours mostly used coaches, while independent travellers (in particular VFR and business) drove cars. This resulted in larger built-up land EFs for independent travellers.

### 5.3.3 EF with age

The size of EFs had a tendency to increase with age, i.e., younger travellers were more energy efficient than older travellers, because energy and transportation footprints of older travellers were frequently larger than younger travellers. Possible explanations include:

- School excursion travellers (the youngest segment) who had small EFs;
- Younger travellers (including different purpose of visit and styles) often stayed in more energy efficient accommodations, such as BBH and YHA, and they were more likely to eat continental/light breakfast than older generations;
- Educational visitors were generally younger segments and my study showed that educational visitors had smaller EF than most other segments;
- Older travellers had more disposable income and prefer comfort and luxurious travel styles, therefore spent more in New Zealand; and
- Older travellers prefer coach tours which travel a long distance.

The age of the travellers often influenced the travel style and consumption patterns. By their age segment, the youngest group (school excursion) had the smallest, and travellers in their 20s had the second smallest average EF. Majority of elderly travellers (over 60 years old) were holiday travellers in package tour (thus stayed in hotels), and many of those travelled long distance by coaches. Their preference to the escorted tours is partly due to their unfamiliarity with overseas' customs, relatively poor English abilities, personal security, and preference of foreign travel without leaving home (see Literature Review). Also, package travellers stay for less time (or only short trip is available as package tour, and if they want to stay longer and they have to be independent travellers).

With an aging society, the EF of tourists may increase in the future. Japan as an aging population and the average age of Japanese tourists is likely to increase. Travel styles are often closely related to age and gender. i.e., elderly travellers tend to join the package tour and enjoy general sightseeing, compared to younger age group who enjoy outdoor activities and are thrill seekers.

### 5.3.4 EF with Length of Stay

Overall, EFs may decrease as the length of stay increased. This could be because Japanese travellers who stayed short commonly stayed in hotel (i.e., energy intensive and more expensive). It was likely that the result was biased due to the small sample size; however, another study also showed the increase energy efficient with the length of stay (Becken, Simmons *et al.*, 2003b). This suggests that longer stay could be an option for energy efficient tourism development. However, it may be difficult for the majority of Japanese tourists to stay longer, because of pressure within the working environment in Japan.

## 5.4 Comparisons with Japanese Residents' EF

The average daily footprint of Japanese travellers was much larger than that of Japanese residents. They consume more energy and resources, in particular, for transport, housing and activities. These considerable differences between being a tourist and a resident can be caused by the following reasons:

- Lifestyle of tourists: As nature of tourists, they travel during the trip. Tourists travel for a longer distance, eat meals at restaurant, try different food, and stay in energy intensive accommodation.
- Psychological dilemma: Most tourists see their annual vacation as an escape from their everyday responsibilities and one of the major attractions of a vacation is that there is no need to be sensible for the duration of the trip (Swarbrooke, 1999). Thus tourists may tend not to conserve resources while they travel because they do not have to worry their energy bills. These could be the underlining causes of larger EF of tourists.

Japanese residents' EF is smaller than that of New Zealand residents except for energy land. In general, per capita income is correlated to the size of the EF of nations. However, Japan's per capita EF is over 20 % smaller than that of New Zealand although per capita income is higher in Japan (McDonald & Patterson, 2003). The Japanese have smaller per capita footprints in everyday travel, food (discussed above) and housing. The transport sector in Japan focuses on energy efficiency. In Japan, public transport is relatively favourable with a 50:50 split between public and private transport (European Conference of Ministers of Transport, 1997). Railways carry 35 % of the public transport share in passenger travel, and car ownership is relatively low compared with other OECD countries (European Conference of Ministers of Transport, 1997). This is partly because of various economic instruments to encourage use of public transport. Use of alternative-powered vehicles or more fuel efficient vehicles is also encouraged while excessive road transport is discouraged through subsidies and tax (European Conference of Ministers of Transport, 1997).

In addition, recycling systems are well developed in Japan since self-governing bodies and retailers started collecting recyclable materials around 10 years ago, and the current recycling rate of plastic bottles is over 60 % in Japan (Tokushima

Shimbun, 2005), which is considerably higher than the corresponding rate in New Zealand (18 %) (Plastics New Zealand, 2003).

Per capita built-up area is also smaller in Japan as many live in relatively small houses (with tiny gardens) or even apartments without gardens. Japan is a highly populated nation with dense urban area, thus it is difficult to occupy large land areas. Due to the long history of dense population, it is fair to say that there are good urban management systems in Japan to cope with a large number of people. These good urban management results in smaller per capita footprints in Japan.

## 5.5 Comparisons with Other Tourists in New Zealand

The resource consumption and behavioural patterns of Japanese travellers were compared with other tourists in New Zealand using IVS and other studies. Although it is difficult to conclude whether Japanese travellers have larger overall EFs than others, Japanese travellers are more energy efficient than other international tourists in following ways:

- Road transportation: Coaches are one of the main transportation methods for Japanese. Other international travellers are more likely to travel with cars, which is more energy intensive per passenger.
- Favouring travel with large groups (including school excursion and escorted tour): As mentioned in the Literature Review chapter, Japanese frequently travel in group owing to their strong social cohesion and collectivism (Gnoth, 2003; Kim & Lee, 2000; Money & Crotts, 2000). Travelling with a large group is energy efficient in many ways. They commonly travel by coaches and the occupancy rate would be close to 100 %. Furthermore, they are more likely to share a room with other member of the tour (at least one or two more people), which increase the energy efficiency in accommodation category.

However, Japanese tourists may have larger impacts by transport, housing/accommodation, goods and services. For example:

- Frequent use of domestic flights;
- Energy intensive accommodation (hotels and farm/home-stay);
- Preference for cooked meals (especially cooked breakfast);
- Large proportion of educational visitors (thus larger EF in services);
- Shopping behaviour (especially souvenir shopping);
- Energy intensive activities (e.g., scenic flights);
- Longer daily travel distance as they tried to visit as many place as possible in short time periods.

Becken and Gnoth (2004) showed that other international travellers also travel long distances in New Zealand, but they generally stay longer, which makes their daily travel distance shorter. In particular, the tourists from Europe stay much longer than

other international travellers; the average ranging from 30 days for British to over 50 days for Swiss (Ministry of Tourism, 2005b). The average size of transport built-up land for Japanese traveller was larger than that of an average international tourist. Shorter stays by Japanese travellers might result in less efficient resource consumers.

The proportion of Japanese education visitors was higher than other international visitors. Those international educational visitors normally require more energy for service, but they are generally more sustainable than other travel.

Becken (2001a) studied the energy requirement of international air travel. If the international air travel were taken into account, one Japanese traveller produces 1.2 tonnes of $CO_2$ per visit. On the other hand, travellers from European countries produce over 2 tonnes of $CO_2$ per visitor visit (e.g., 2.4 tonnes from the United Kingdom and 2.5 tonnes from Germany) and American travellers generate 1.4 tonnes per visit. While Australian visitor emits only 0.42 tonnes of $CO_2$ per visit (Becken, 2001a). This indicates that European travellers are likely to have the larger EF than travellers from other major market and the EF of an Australian tourist may be the smallest if the international air travel was included.

## 5.6 Potential Solutions to Reduce EF

The results of EFA indicated that the EF of Japanese tourists was not ecologically sustainable. Energy footprint was a particularly concern and need to consider better management strategies. Housing, transport and activities were the main contributors to the large energy footprints, but there are potential solutions to reduce the size of these footprints. Due to the fact that tourism is such a broad industry, many sectors are involved and they all need to work together to make the tourism industry more ecologically sustainable. The key sectors to reduce the size of EF would be accommodation providers, transport sector, food industry, tour operator, and media and information providers.

There are several strategies that could be employed to reduce the EF of tourists in New Zealand. Different options of instruments (OECD, 2001) include:

- Economic instruments
- Regulatory instruments
- Voluntary instruments
- Incentives for technological development and diffusion
- Info-based instruments
- Other policies

### 5.6.1 Tourism Industry

#### *5.6.1.1 Accommodation Providers*

Accommodation/housing footprint was one of the main concerns due to high energy requirement in the accommodation, which indicated that accommodation providers are one of the key sectors to reduce the size of EF. There are many potential management strategies, but there are already many environmental awareness programmes within the accommodation sector that could reduce the environmental impacts.

International Hotels Environmental Initiative (IHEI) is the best known

voluntary industry initiative in tourism (Swarbrooke, 1999). IHEI provides a guide to a good environmental practice in the hotel sector (e.g., waste management, energy and water conservation, water quality, air emission, and noise). The guidelines also include examples of hotels which have successfully introduced environmental management policies. The members include Accor, Hilton International, Inter-Continental, and ITT Sheraton (these groups operate in New Zealand). Novotel hotel (Accor group), for example, encourage the visitors who stay multiple nights to reuse linens and towels to reduce washing (Fig. 68). This help reducing the amount of water and detergents used in hotels as well as reducing waste water. Furthermore, reducing the linen exchange will also cut the $CO_2$ emissions as approximately 20 % of $CO_2$ emissions from guest rooms are due to laundry (Shimogiri, 2005). This practice would reduce the size of energy, goods, water and waste footprints.

Encouraging travellers to stay in these hotels would reduce the size of EF thus reduce the impact of the tourists. Some of these hotels are already popular among Japanese travellers, while further encouragement to stay in these hotels may be helpful. Other examples of organisations promoting environmental friendly accommodation management in New Zealand are Environmental Hotels of Auckland (EHOA) and South Pacific Tourism Organisation. They provide a checklist of energy-efficiency options (Table 48). Hotels and resorts in Rotorua district also had a similar project, called the 'Cleaner Production and Tourism Sector Project' as a joint project of the Ministry for the Environment and the Rotorua District Council in 1993 (Gilling & Bailey, 1994). Five accommodations and three tourism ventures were involved in this project. The project was unique in each establishment, but generally involved the following initiatives:

- Use of recycled products (e.g., stationery);
- Recycling materials;
- Water conservation (e.g., installation of dual flush toilet);
- Improvement of handling of hazardous substances;
- Energy conservation (e.g., installation of energy efficient light bulbs); and
- Good housekeeping (e.g., turn off heating and lighting when it is no being used).

In addition, Swarbrooke (1999) suggested the following management options:

- Use of energy-conservation measures such as insulation;
- Use unbleached and un-dyed fabrics; and

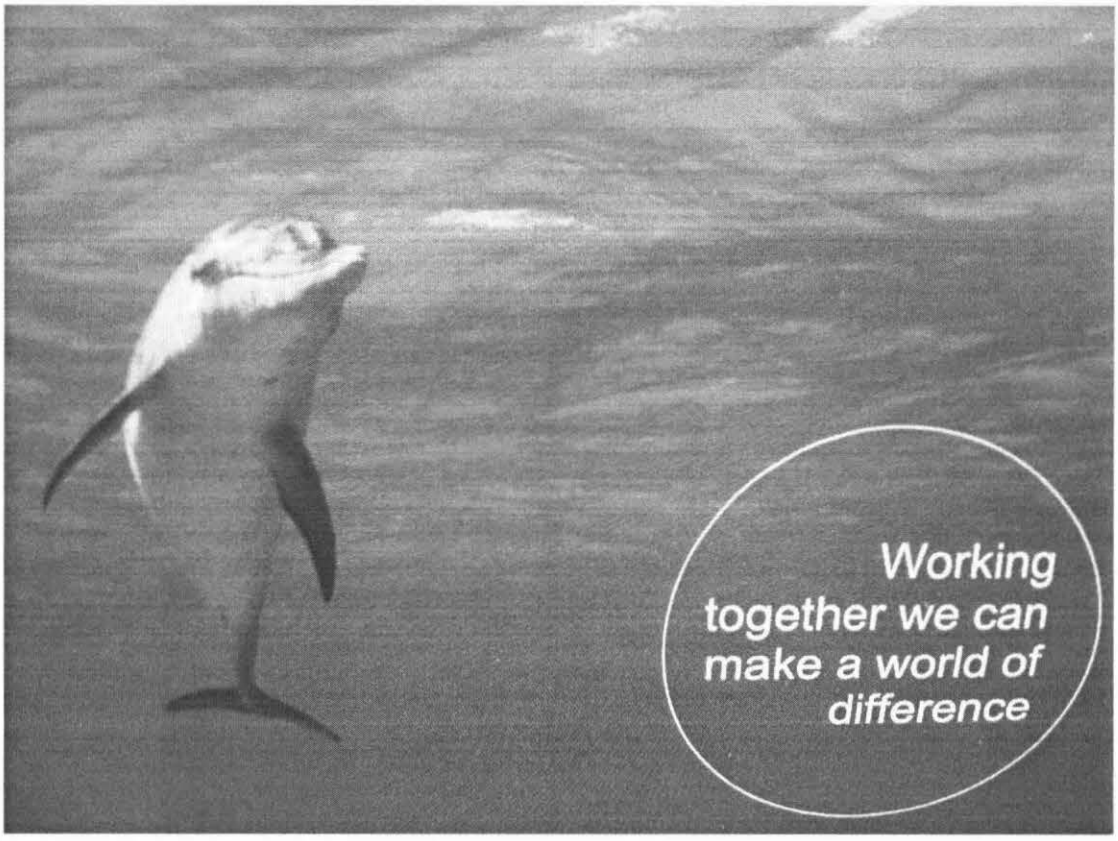
- Develop solar powered water heating systems.

Some actions are very simple and easy to perform, yet can make a substantial difference towards more sustainable development, reducing the size of EF. Changing to water-efficient shower heads is an example and can save about 14 $m^3$ of water and 740 kWh of energy per year (EMANZ, 2002).

Improving recycling systems is also important. Currently there are not many products being recycled in New Zealand. The types of plastics which can be recycled are limited. The Ministry for the Environment revealed that the New Zealand recycle rates were 39 % for paper and cardboard, 23 % for oil, 14 % for plastic, 12 % aluminium, and unknown for steel and glass (Ministry for the Environment, 1997b). Many other developed countries have higher recycling rate than New Zealand. New Zealand set the national recycling targets for the recovery of packaging materials to be 65 % for aluminium, 55 % for glass, 70 % for paper, 43 % for steel, and 23 % for plastic by 2008 (Ministry for the Environment, 2004). Significant amounts of energy would be saved by recycling (Table 49) because recycling requires only a small portion of the energy compared to producing from the raw materials (ore, wood, etc.), as well as saving the raw materials. Higher recycling rates directly influence the size of EF as less energy and raw materials were required, and potentially productive land would not be wasted as a landfill. Since most tourism related wastes are produced in the retail, shops, restaurants, and accommodation facilities, recycling can be encouraged by means of regulatory or economic instruments. In many OECD countries, recycling is the producer's responsibility (OECD, 2001).

In Japan, there is a system to evaluate accommodation providers to determine their environmental performance (e.g., reduction of waste production, energy and water conservation, and use of eco-products). One of the largest Japanese travel wholesalers, Kinki Nippon Tourist (KNT), has also started a similar evaluation scheme for hotels in Japan (Shimogiri, 2005). A similar programme can be introduced in New Zealand to lead to better environmental practices amongst accommodation providers.

**Fig. 66 Photo of a leaflet in bathroom (Novotel in Palmerston North, Accor Group).**




## Join Us in Conserving Water & Energy for the Future

Everyday millions of litres of water and detergents filter back into our waterways from the laundry process. To help reduce this you can choose to keep your towels and bed linen an extra day.

To re-use towels hang them up in your bathroom. When you require them to be changed simply leave them on the floor for housekeeping to collect.

If you are staying with us for multiple nights your bed linen is laundered regularly. If you do not require your linen changed simply place this card for housekeeping on your pillow in the morning.

ACCOR Visit www.accorhotels.co.nz for information on our other environmental initiatives.
Over 3,500 hotels and resorts worldwide

SOFITEL • NOVOTEL • MERCURE • IBIS • FORMULE 1 • ALL SEASONS

**Table 48 A checklist of energy-efficiency options developed by Environmental Hotels of Auckland (EHOA) and South Pacific Tourism Organisation (South Pacific Tourism Organisation, c1996).**

| | |
|---|---|
| Space and water heating | - Ensure only occupied areas are heated<br>- Set water heater temperature to 60°C |
| Lighting | - Make sure someone responsible for switching off lights when areas are not in use<br>- Make the best use of daylight |
| Ventilation | - Ensure kitchen fans are switched off when kitchens are not in use |
| Air conditioning | - Set temperature controls for cooling to 24 °C or higher<br>- Ensure refrigeration plant, such as chilled water systems, runs only when required |
| Equipment | - Encourage staff to turn off equipment when it is not needed<br>- Switch off fluorescent lights when an area will be unoccupied for longer than 5 minutes<br>- Remove unnecessary lamps |
| Laundry | - Set washing machine temperature to 60 °C<br>- Encourage staff to run laundry equipment only with full loads |
| Controls | - Clearly label controls to indicate their function and their reduced settings |
| Catering | - Inform kitchen staff of start-up times for cooking equipment and discourage them from using hobs and ovens for space heating |
| Maintenance | - Check plant operation and controls regularly<br>- Check that thermostats and humidistat are accurate<br>- Check calibration of control<br>- Look for water leaks from mains, taps and showers and carry out necessary repairs<br>- Clean light fittings regularly |

**Table 49 Percentage of energy saved if the products were recycled (OECD, 2001).**

| | | | |
|---|---|---|---|
| Aluminium | 95% | Copper | 85% |
| Lead | 65% | Zinc | 60% |
| Paper | 64% | Plastics | 80% |

#### *5.6.1.2 Transport Sector*

Transport footprint was the largest contributor to the EF. The energy footprints for transport can be reduced by using more energy efficient transport methods. Travelling by coach is the dominant form of road transport for Japanese travellers in New Zealand. Although coaches are more energy efficient than other transportation methods, their energy use can still be improved. Several alternative fuel sources are already available and these are more energy efficient and better for the environment. Liquid petroleum gas (LPG) powered vehicles may be able to achieve a 20 % reduction in greenhouse gases emissions, and compressed natural gas (CNG) is potential to reduce 20 % of $CO_2$ emissions compared to petrol (European Conference of Ministers of Transport, 1997). Also, the development and use of hybrid, electric and fuel cell vehicles can significantly reduce the fuel consumption in the transport sector. Hybrid-electric-drive vehicles have been introduced commercially and it helps reducing $CO_2$ emissions (approximate of 20 and 25 %) (Transportation Association of Canada, 1999). Hybrid vehicles have been introduced in tourism-related activities in other countries (e.g., hybrid vehicles as rental cars). In New Zealand, the hybrid buses have been introduced in Christchurch and Auckland (Becken, 2004). There are more examples in other countries. In New York, the use of hybrid vehicles as taxis has started (Muldoon & Mattei, 2005). Hydrogen fuelled public transport is already in place in some countries (e.g., Canada and Germany) (Becken, 2002). These environmentally friendly practices could be introduced to New Zealand to reduce air pollution and global warming. These transportations produce less $CO_2$, thus it could substantially reduce the energy footprints in the transport sector, which is the major concern for the ecological sustainability in tourism.

The government may help to improve bus fuel efficiencies through subsidies and tax as performed in many other OECD countries (European Conference of Ministers of Transport, 1997).

#### *5.6.1.3 Food Industry*

The food industry is another important contributor to in the tourism industry. Almost 80 % of Japanese travellers eat out during their trip (Ministry of Tourism, 2005a), thus restaurants and cafés can contribute to reduce their EF. In order to reduce the size of EF and to reduce environmental impacts, food wastes could be collected by a pig

farmer for feed or sent to a worm farm or be composted. Recycling within food industry could also be encouraged.

#### *5.6.1.4 Tour Operators and Guide*

In order to reduce the size of footprint, tour organisers and guides could be important players. Tour organisers and wholesalers design the tour itinerary and can, therefore, influence the energy consumption patterns of Japanese travellers. For example, they can choose accommodation with sound environmental practices. The tour guides accompany tourists on their trips and interpret for them, therefore the guide can play a significant role in the implementation of sustainable tourism (Swarbrooke, 1999). The guide needs to be well trained and informed about sustainable tourism and efficient resource use.

#### *5.6.1.5 Media and Other Information Providers*

The influence of the media and other information providers can never be underestimated. Swarbrooke (1999) noted how media can play a significant role in both shaping tourist behaviour and raising awareness of issues relating to sustainable tourism. The media can contribute to education and marketing programmes to change people's perception and make trips more enjoyable while conserving resources. The following are suggestions to promote sustainable development to tourism sector:

- Promote a region rather than a whole country, to encourage longer stays in the region rather than travelling a longer distance to see as many places as possible in a short time. This might reduce the size of transport footprint (both energy and built-up land);
- Use of more sustainable transportation methods (e.g., public transport, coaches) to reduce the size of transport footprints;
- Less energy intensive activities, but more energy efficient attractions to make service/activity footprint smaller;
- Stay in accommodation with better environmental practices, or less energy intensive accommodation for smaller energy footprints;
- Use local products to reduce the size of energy footprint as the local products require less energy to transport the products; and

- Purchase of products that has least impact on the environment. This may not directly help reducing the size of footprints, but is better for ecological sustainability.

The Visitor Information Network (VIN) provide information about the region and tourism products and they contributes to encourage visitors to stay longer and see more of the regions of New Zealand (New Zealand Tourism Board, 1996b). VIN may be less important among Japanese travellers as many Japanese travellers visit as package with tight schedules. VIN can probably be more important for SIT or FIT segments.

Educating tourism operators and travellers to raise the awareness of environmental issues related to tourism development is important. It is challenging to change the behaviour of tourists, as they are at the destination to fully enjoy their holiday. One study showed that travelling is an integral part of a New Zealand holiday; thus tourists are unlikely to change their itineraries or drop major attractions to extend their stay at one particular place (Becken & Wilson, 2004). We could create better management systems to reduce EF without compromising the satisfaction of the tourists.

#### *5.6.1.6 Ecotourism*

Ecotourism or eco-tour is a newly developed concept of sustainable tourism. Although there are no clear definitions of 'ecotourism', it generally has less environmental impact and is more sustainable. Ecotourism commonly focuses on careful management to minimize biophysical impacts and provide positive impacts to the local communities. They frequently restrict the number of visitors to the particular activities or places (Gilbert, 1997), which is good for environment; however it may limit the economical benefits to the destinations. Maori cultural tourism is probably categorized as ecotourism because it has positive socio-cultural and economical impacts on the local communities as well as educational value with the least ecological impacts.

The eco-tourism segment is gaining momentum in Japan (Tourism Australia, 2005). There is potential for Japanese tourists to be involved in ecotourism with effective advertising and marketing programmes; because the majority of Japanese

tourists are attracted to New Zealand's nature and culture. Many young Japanese are also attracted to the adventure or outdoor activities. The concept of ecotourism and the size of EF may not have clear correlations, but carefully managed tourism activities could result in less environmental impacts thus smaller EF.

### 5.6.2 Technological Improvement

It is possible for technology to improve the efficiency of resource consumption and production. To illustrate this, Becken and Cavanagh (2003) studied the overall energy efficiencies and it increased in 2001 compared to 1999, mainly due to decline in domestic tourist number, but also increases in technological and operational energy efficiencies and minor changes in tourist behaviour. With technological improvement, the size of EF (mainly energy footprints) would be reduced by generating less amount of $CO_2$. Potential technological solutions include:

- Transportation methods with less $CO_2$ emissions, such as electric vehicles, hybrid-electric-drive vehicles, and development of fuel cell. Electric vehicles generated from hydro-powered plants will significantly reduce $CO_2$ emissions. However, their performance and range capacity is still limited and have not been practical (European Conference of Ministers of Transport, 1997). Development of alternative fuels such as hydrogen fuel cell for buses is progressing, while significant technological, economic, and policy developments are required (Chernicoff, Brecher, & Green, 2002). Also fuel combustion technology improvements may be improved further.
- Weight reduction in automobiles may be potential. Over the life of an average passenger car (about 100,000 miles), each pound of weight reduction can save about 1 gallon of fuel (Das, Curlee, Rizy, & Schexnayder, 1995).
- The use of renewable (e.g., manure and kitchen waste for biogas, photovoltaic energy conversion from rooftops) energy will reduce the $CO_2$ emissions and in some cases (such as green waste) reduce the land requirement for waste disposal. With technological development, utilization of these renewable resources can be more affordable and cost effective.

## 5.7 Future Tourism

The travel behaviour of Japanese tourists is expected to change in the future once the Japanese travellers become more confident to travel abroad. The experienced travellers may not choose to purchase the package tours, and the number of FIT may increase. While, it is also possible that the number of package tourists remain large or even increase with increasing number of aging population, because the elderly travellers may prefer package tours.

The current proportion of elderly people (aged 65+) is 17.9 % in Japan will exceed 25 % by the year 2015 (Mak *et al.*, 2004; Marketing British Tourism, 2003). Mak *et al.* (2004) predicted that senior group would be the largest group of travellers, while demand for overseas travels may increase for all other age groups except among the 20s and early 30s age group. Study by You and O'leary (2000) indicated that the travel styles, activities, and popular destinations might change with more senior travellers even if the number of tourists might not be influenced by the aging population. Senior travellers tend to stay one place rather than travelling to many places (You & O'Leary, 2000). My study showed that older travellers may have larger EFs than the younger travellers. This indicates that the EF of the Japanese travellers may enlarge in the future. However, the characteristics of elderly travellers may change in the future. The 'greying' phenomenon accompanied by a changing lifestyle with increased free time and the perception of travel being viewed as part of a balanced lifestyle (Marketing British Tourism, 2003) is expected to have major effects in future tourism industry.

In addition to the aging population, an increase in the number of Japanese educational visitors to New Zealand may also alter the current dynamics of Japanese travellers. Educational visitors bring more VFR travellers.

# CHAPTER SIX:

# *CONCLUSION & RECOMMENDATIONS*

## *6.1 Conclusion*

The EF of Japanese tourists in New Zealand is ecologically unsustainable, which indicates that the New Zealand tourism industry relies on ecological hinterland or there might have been some impacts as a consequence of tourism activities (e.g., global warming, loss of productivities and habitat loss). Tourists' daily EF is much larger than the global biocapacity available per person and their daily EF slightly exceeded the per capita daily biocapacity of New Zealand, which is one of the largest in the world. This EF did not include international flights and many other indirect resource consumptions, yet it was still considerably large. The EF calculated in this study might be conservative and the true EF of Japanese tourists in New Zealand would be significantly larger if entire resource and energy requirements were included. This suggests that the true EF of Japanese travellers is far from being ecologically sustainable. Also, this study confirmed that Japanese visitors consume more resources during their trip compared with when they are at home in Japan.

The energy footprint is the largest of all six land types, and was much larger than that of New Zealand residents. Tourists' main energy consumption was transport, housing and activities. The size of the transport footprint was markedly larger than both Japan's and New Zealand's footprints. Transport was the major contributor to the large energy and built-up land. Although many Japanese tourists use coaches that are more energy efficient, they tend to travel longer daily distances due to their short stay.

Japanese travellers had large accommodation/housing footprints as they frequently stayed hotels and farm/home-stays, which were the two most energy intensive accommodations. In addition, other Japanese travellers' activities such as shopping and eating habit in New Zealand, might contributed to larger footprints.

Each segment of travellers has different consumption patterns, thus different impacts. Holiday travellers, who were the dominant segment of Japanese tourists, had

large housing and goods footprints. Business travellers had the largest transport footprints since they mainly travel by car/van. VFR had relatively large footprints in transport and goods categories, while they had the smallest housing footprints as they were likely to stay at their friend/relative's house. Although education visitors had the largest footprint for service, they appeared to have more potential to be ecologically sustainable as they had overall small to medium size EF and were probably more sustainable in both ecological and socio/economical terms. On the other hand, school excursion visitors were the most ecological sustainable segment, having the smallest EF.

Travel styles also influence impacts. All package travellers (regardless to their itinerary) stayed in hotels; as a result, they have larger housing footprints. Independent travellers generally had smaller housing footprints but they have larger transport footprints as they travel by cars/vans. In addition, age of tourists may affect the size of EF. Younger travellers tend to have smaller EF than elderly travellers, which may suggest the increase in the size of EF in the future due to the aging population. When travellers stayed longer, their daily footprints may become smaller, although there were no significant correlations.

The most sustainable form of traveller may be someone who stay longer at each destination, travel shorter distance, use more sustainable transportation methods (e.g., coach bus), undertake less energy intensive activities and stay in energy efficient accommodation.

Japanese travellers seem to have a larger EF than other international travellers in New Zealand when it comes to accommodation, goods, and activities. Other studies indicate that the Japanese could be one of the most energy intensive travellers. Their relatively short stay might contribute to their larger daily EF. However, their travel preferences of a group tour and road transportation method (i.e., frequent use of coaches) were likely to be more energy efficient. This study provided a structure and resource consumption pattern of Japanese tourists in New Zealand. Therefore, this study might also provide useful information regarding the rapidly growing Asian tourism market as well as insights into how it could be made more sustainable.

The causes and the extent of high resource consumption by Japanese tourists were recognised through EFA in this study. This outcome could be used for better tourism management. Although a holiday is seen to be a time to be carefree, tourists

need to realise their impacts to the environment. "There is little point, after all, in running [tourism] operation for short-term profit in such a way as to damage the very natural features or cultures that people have come to see" (Gilbert, 1997).

## 6.2 Recommendations

### 6.2.1 Management Strategies

Sustainable tourism is about maximising the positive impacts and minimising the negative ones (Swarbrooke, 1999). Well managed tourism can bring great social, economic and environmental benefits but can also be the source of problems if it is poorly managed. To maximise the positive effects and minimise the negative impacts, the industry needs to be managed properly.

There are many strategies to reduce tourist's EF. Some methods can be easily implemented while others may require further development. Tourism is a complex industry that requires support from many industries and stakeholders. The promotion of sustainable development is a challenge to both government and the industry. There are many existing voluntary organisations contributing towards sustainable tourism development. Educating tourist and tourism related business is also important to raise awareness. More effective marketing approaches may help altering the perception of the travellers.

The New Zealand tourism industry needs to be carefully developed in a sustainable manner for the future. The technological improvement will potentially reduce the EF of any given population including the Japanese tourists. However, technological improvements alone may not be sufficient to ensure the sustainability of tourism in New Zealand. So it is important that all possible efforts are made to maintain New Zealand's unique environment.

### 6.2.2 Further Research Requirements

This study provided a benchmark of the resource utilisation by Japanese tourism in New Zealand. This study can be repeated in the future to see if there would be any changes in the size of EF (in both positive and negative ways) with better management strategies, technological improvements or changes in tourist behaviour.

Further EF time series calculations could yield useful information in the future. In addition, EFA may be repeated with travellers from different nations to compare the differences. Comparison of EFs with visitors from different nationalities may be interesting.

The waste footprint was not fully integrated in the analysis due to missing data. Other indirect energy and resource consumption data (e.g., transport of goods according to the actual distance from the original production places) were also excluded. If more resources and time were available, a more rigorous study with a larger sample size of survey could be undertaken.

This study focused the ecological sustainability of Japanese tourism in New Zealand, but the concept of actual sustainability has broader implications. Although EFA can be one of the best available methods to evaluate the ecological sustainability, there are many limitations. To assess the actual sustainability, other research methods may be employed along with EFA. As suggested by Gossling *et al.* (2002), EFA could be a meaningful method to assess ecological sustainability of tourism if employed with Environmental Impact Assessment (EIA) or limits of acceptable changes (LAC), which can examine the local ecological sustainability. As noted by some Japanese travellers, there are some issues related to socio-cultural dimensions, such as racism and behaviour of tourists. These issues also need to be addressed for the future sustainability of tourism industry.

# VI. References


Aebischer, B., Balmer, M. A., Kinney, S., Le Strat, P., Shibata, Y., & Varone, F. (2003). *Energy Efficiency Indicators for High Electric-Load Buildings.* Cote s'Azur: ECEEE.

Air New Zealand. (2005). Air New Zealand Fleet Table, Flight Times and Distances. *Air New Zealand Magazine, February 2005,* 98 - 101.

Andersson, J. O., & Lindroth, M. (2001). Ecologically Unsustainable Trade. *Ecological Economics, 37*(1), 113-122.

APEC. (1996). *Environmentally Sustainable Tourism in APEC Member Economies.* Singapore: APEC Working Group.

Ayres, R. U. (2000). Commentary on the Utility of the Ecological Footprint Concept. *Ecological Economics, 32*(3), 347-349.

Barringer, J., Walcroft, A., Forer, P., & Hughey, K. (c2002). *Development of an Environmental Effects and Tourist Flow Data Management System.* Lincoln: Landcare Research.

Becken, S. (2000). *Energy Use in the New Zealand Accommodation Sector; Report of a Survey.* Canterbury: Lincoln University.

Becken, S. (2001a). Analysing international tourist flows to estimate energy use associated with air travel. *Journal of Sustainable Tourism, 10,* 114 - 131.

Becken, S. (2001b). *Energy Consumption of Tourist Attractions and Activities in New Zealand.* Canterbury: Lincoln University.

Becken, S. (2002). *Tourism and Transport in New Zealand; Implications for Energy Use* (No. 54). Lincoln: Tourism Recreation Research and Education Centre Lincoln University.

Becken, S. (2003a). *Chinese Tourism to New Zealand; Discussion Paper*: Landcare Research.

Becken, S. (2003b). *An Integrated Approach to Travel Behaviour with the Aim of Developing More Sustainable Forms of Tourism* (No. LC0304/005). Lincoln: Landcare Research.

Becken, S. (2004). *Report on the Workshop; Tourism and Climate Change - Where to from Here?* Wellington: Ministry of Tourism.

Becken, S. (c2002). *Making Tourism in New Zealand Energy-efficient; More than Turning off the Lights* (No. EEP2). Canterbury: Lincoln University.

Becken, S., & Cavanagh, J. A. (2003). *Energy Efficiency Trend Analysis of the*

*Tourism Sector* (No. LC0203/180). Lincoln: Energy Efficiency and Conservation Authority & Landcare Research Institute.

Becken, S., Frampton, C., & Simmons, D. G. (2001). Energy Consumption Patterns in the Accommodation Sector; the New Zealand Case. *Ecological Economics, 39*(3), 371-386.

Becken, S., & Gnoth, J. (2004). Tourist Consumption Systems among Overseas Visitors: Reporting on American, German, and Australian Visitors to New Zealand. *Tourism Management, 25*(3), 375-385.

Becken, S., & Simmons, D. G. (2002). Understanding Energy Consumption Patterns of Tourist Attractions and Activities in New Zealand. *Tourism Management, 23*(4), 343-354.

Becken, S., Simmons, D. G., & Frampton, C. (2003a). Energy Use Associated with Different Travel Choices. *Tourism Management, 24*(3), 267-277.

Becken, S., Simmons, D. G., & Frampton, C. (2003b). Segmenting Tourists by Their Travel Pattern for Insights into Achieving Energy Efficiency. *Journal of Travel Research, 42*(1), 48 - 56.

Becken, S., Simmons, D. G., & Hart, P. (2003, April). *Tourism and Climate Change; New Zealand Response.* Paper presented at the 1st International Conference on Climate Change and Tourism, Djerba, Tunisia.

Becken, S., & Wilson, J. (2004). *Trip Planning and Decision Making of Self-drive Tourists*. Lincoln: Landcare Research Institute.

Bicknell, K. B., Ball, R. J., Cullen, R., & Bigsby, H. R. (1998). New Methodology for the Ecological Footprint with an Application to the New Zealand Economy. *Ecological Economics, 27*(2), 149-160.

Black, W. R. (2004). Sustainable Mobility and its Implications for Tourism. In L. Lumsdon & S. J. Page (Eds.), *Tourism and Transport; Issues and Agenda for the New Millennium* (pp. 57 - 68). Amsterdam: Elsevier.

Blaschke, P., Cooper, R., Cox, C., James, G., & Lough, C. (1997). *Management of the Environmental Effects Associated with the Tourism Sector.* Wellington: Office of the Parliamentary Commissioner for the Environment.

Boardman, D. (1982). Japanese and New Zealanders. In A. Langford (Ed.), *Tourism from Japan; Prospects, Promise, Problems* (pp. 36 - 39). Wellington: Japan Advisory Committee.

BRANZ. (2003). *Energy Use in New Zealand Households - Executive Summary: Report on the Year 7 Analysis for the Household Energy End-Use Project (HEEP)* (No. SR 122): BRANZ.

Burton, H. M. (2003). Cross-Cultural Exchange between Japan and New Zealand. In S. J. Epstein (Ed.), *Japan-New Zealand Tourism and Cross-Cultural Exchange* (pp. 13 - 15). Wellington: Asian Studies Institute of Victoria University.

Business Standard. (2005, 25 May). AP: Japan and Asia. *Business Standard.*

Carbon Sequestration Leadership Forum. (2005, 16 December). *An Energy Summary of Japan.* Retrieved 12 January, 2006, from http://www.cslforum.org/japan.htm

Central Intelligence Agency. (2005, 17 May). *The World Factbook.* Retrieved 25 May, 2005, from http://www.cia.gov/cia/publications/factbook

Cessford, G. R., & Dingwall, P. R. (1999). *An Approach to Assessing the Environmental Impacts of Tourism.* Wellington: Department of Conservation.

Cha, S., McCleary, K. W., & Uysal, M. (1995). Travel Motivations of Japanese Overseas Travelers; a Factor-Cluster Segmentation Approach. *Journal of Travel Research, Summer*, 33 - 39.

Chambers, N., Simmons, C., & Wackernagel, M. (2000). *Sharing Nature's Interest; Ecological Footprints as an Indicator of Sustainability.* London: Earthscan.

Chernicoff, W. P., Brecher, A., & Green, K. (2002). *Promising Transit Applications of Fuel Cells; Alternative Fuels and their Applications.* Cambridge, Massachusetts: U.S. Department of Transportation.

Cockerell, N. (2004). *World Travel Market Global Travel Report 2004/05*: The Travel Business Partnership.

Cohen, J. E. (1995). *How Many People can the Earth Support?* (1st ed.). New York: Norton.

Cole, V. (2000). *Using Ecological Footprint Analysis to Measure Sustainability in a Himalayan Tourist Centre.* University of Manitoba, Winnipeg, Manitoba.

Collier, A., & Brocx, B. M. (Eds.). (2004). *Tourism Industry Management.* Auckland: Pearson Education.

Covec Limited. (2004). *International Length of Stay and Expenditure Forecasts 2004 - 2010.* Wellington: Tourism Research Council New Zealand.

Das, S., Curlee, T. R., Rizy, C. G., & Schexnayder, S. M. (1995). Automobile Recycling in the United States; Energy Impacts and Waste Generation. *Resources, Conservation and Recycling, 14*(3-4), 265-284.

Davies, E., Burns, G., Coughlan, G., Hickton, G., Logan, H., Love, N., et al. (2001). *New Zealand Tourism Strategy 2010.* Wellington: Tourism Strategy Group.

Department of Sport Recreation and Tourism. (1986). *Japan-Australia Tourism; a Discussion Paper.* Canberra: Dept. of Sport, Recreation and Tourism.

EECA. (1999). *New Zealand's Transport Sector Energy Use; Highlights* (No. 14). Wellington: EECA.

EECA. (2000). *Energy-Wise Monitoring Quarterly; Household Sector* (No. 15).

Wellington: EECA.

Ehrlich, P., & Holdren, J. (1972). Review of Closing Circle. *Environment, 14*(3), 24 - 39.

EMANZ. (2002). *Bloggsville Motor Inn; Restaurant Rnergy Audit*: EMANZ.

Epstein, S. J. (Ed.). (2003). *Japan-New Zealand Tourism and Cross-Cultural Exchange*. Wellington: Asian Studies Institute Victoria University of New Zealand.

European Conference of Ministers of Transport. (1997). *CO2 Emissions from Transport*. Paris: ECMT.

Forer, P., & Simmons, D. G. (c1997). *Analysing and Mapping Tourist Flows*. Canterbury: Lincoln University.

Freathy, P. (2004). The Changing Airport Environment; Past, Present and Future Imperfect? In L. Lumsdon & S. J. Page (Eds.), *Tourism and Transport; Issues and Agenda for the New Millennium* (pp. 106 - 115). Amsterdam: Elsevier.

Gilbert, J. (1997). *Ecotourism Means Business*. Wellington: GP Publications.

Gilling, T., & Bailey, M. L. (1994). *Cleaner Production and the Tourism Sector*. Wellington: Ministry for the Environment.

Gnoth, J. (2003). The Japanese Cultural Tourist in New Zealand. In S. J. Epstein (Ed.), *Japan-New Zealand Tourism and Cross-Cultural Exchange* (pp. 27 - 35). Wellington: Asian Studies Institute of Victoria University.

Gnoth, J., & Watkins, L. (2002). *The Japanese Tourist Market to New Zealand*. Dunedin: Dept. of Marketing, University of Otago.

Gossling, S. (2001). The Consequences of Tourism for Sustainable Water Use on a Tropical Island; Zanibar, Tanzania. *Journal of Environmental Management, 61*, 179 - 191.

Gossling, S., Hansson, C. B., Horstmeier, O., & Saggel, S. (2002). Ecological Footprint Analysis as a Tool to Assess Tourism Sustainability. *Ecological Economics, 43*(2-3), 199-211.

Hashimoto, A. (2000). Young Japanese Female Tourists; an In-Depth Understanding of a Market Segment. *Current Issues in Tourism, 3*(1), 35 - 50.

Hollinger, D. Y., MacLaren, J. P., Beets, P. N., & Turland, J. (1993). Carbon Sequestration by New Zealand's Plantation Forests. *New Zealand Journal of Science, 23*(2), 194 - 208.

Hunter, C. (2002). Sustainable Tourism and the Touristic Ecological Footprint. *Environment, Development and Sustainability, 4*(1), 7-20.

Hyde, K. (2004). Marketing. In A. Collier & B. M. Brocx (Eds.), *Tourism Industry*

*Management* (pp. 117 - 145). Auckland: Pearson Education.

Isogai, M. (2004, 26 July). *2003 nen no Nihon-jin kaigairyokou no jittai to shikou; JTB Report 2004 [the Reality and Fashion of Japanese Outbound in the Year 2003]*. Retrieved 23 June, 2005, from http://www.tourism.jp/trend/column/archives/000918.php

Japan Association of Travel Agents. (2001, 20 February). *Communication from JATA; an Overview of the Japanese Travel Industry*. Retrieved 24 June, 2005, from www.wto.org/english/tratop_e/serv_e/job01_2x_japan.doc

Japan National Tourist Organization. (2005, 20 June). *Statistics of Japanese Tourists Traveling Abroad*. Retrieved 23 June, 2005, from http://www.tourism.jp/english/statistics/outbound/

Japan Tourism Marketing Co. (2005, 20 June). *Statistics of Japanese Tourists Travelling Abroad*. Retrieved 23 June, 2005, from http://www.tourism.jp/english/statistics/outbound/

Johnson, M. (1982). Attracting the Japanese Tourist. In T. Larkin (Ed.), *Tourism from Japan; Prospects, Promise, Problems* (pp. 40 - 46). Wellington: Japan Advisory Committee.

Jolliffe, A. (2004). The Macro Business Environment. In A. Collier & B. M. Brocx (Eds.), *Tourism Industry Management* (pp. 36 - 56). Auckland: Pearson Education.

Jones, T., & Sleeman, R. (2002). *Your Vision for Tourism; Community Tourism Planning: a Guide to the Sustainable Co-ordination, Development and Management of Tourism in Small Communities*. Christchurch, N.Z.: Tourism Industry Association of New Zealand.

JTM/ TFWA. (2003). *JTM/ TFWA Japanese Traveller Study*. Retrieved 24 June, 2005, from http://www.tfwa.com/duty_free/uploads/media/executivebrief2003.pdf

Kates, R. W. (2000). Population and Consumption; What We Know, What We Need to Know. *Environment, 42*(3), 10 -19.

Kim, C., & Lee, S. (2000). Understanding the Cultural Differences in Tourist Motivation Between Anglo-American and Japanese Tourists. In K. S. Chon, T. Inagaki & T. Ohashi (Eds.), *Japanese Tourists; Socio-Economic, Marketing and Psychological Analysis* (pp. 153 - 170). New York: The Haworth Press.

Kyodou Shimbun. (2005a, 23 April). 14 kou ga chugoku iki wo miokuri; anzen huan, 58kou mo saikenntou [14 Schools Cancelled School Excursion to China, 58 Schools also Reconsider for Safety]. *Kyodou Shimbun [Japanese Newspaper]*.

Kyodou Shimbun. (2005b, 19 April). Chugoku heno shugakuryokou wo chushi; ehime no kenritukou [Cancelling school excursion to China; Public High School in Ehime]. *Kyodou Shimbun [Japanese Newspaper]*.

Kyodou Shimbun. (2005c, 13 April). Chugoku-ryokou no Cancel aitsugu;

kennairyokougaisya, hannichidemo de [Cancelling School Excursion to China Continues; Due to the demonstration against Japan]. *Kyodou Shimbun [Japanese Newspaper]*.

Kyodou Shimbun. (2005d, 18 April). GW no Narita, riyousya saikou ka. Chugoku rosen ha hannichi demo eikyou [Record number of people using Narita Airport during GW; Influence of Demonstration against Japan in Departing China]. *Kyodou Shimbun [Japanese Newspaper]*.

Kyodou Shimbun. (2005e, 12 May). GW shutsu-nyukokusha ha kako saikou; Narita koukuu, 856000nin [Record Number of Inbound/Outbound during GW at Narita Airport, 856000 people]. *Kyodou Shimbun [Japanese Newspaper]*.

Kyodou Shimbun. (2005f, 19 April). houzin kyaku, Hongkong mo keien; hannichi demo no eikyou de [Japanese travellers avoid Hong Kopng too; due to the Influence of Demonstration against Japan]. *Kyodou Shimbun [Japanese Newspaper]*.

Kyodou Shimbun. (2005g, 29 April). Kankuu demo shukkoku peak; ogata renkyuu kaigai de [The number peaked at Kansai Airport to travel abroad during the long holiday]. *Kyodou Shimbun [Japanese Newspaper]*.

Langford, A. (1982). The Use of New Zealand Financial Resources on Tourism from Japan. In T. Larkin (Ed.), *Tourism from Japan; Prospects, Promise, Problems* (pp. 32 - 35). Wellington: Japan Advisory Committee.

Lawson, R. (1991). Patterns of Tourist Expenditure and Types of Vacation across the Family Life Cycle. *Journal of Travel Research, Spring*.

Loh, J., & Wackernagel, M. (Eds.). (2004). *Living Planet Report 2004*. Gland: WWF.

Lumsdon, L., & Owen, E. (2004). Tourism Transport; the Green by Initiative. In L. Lumsdon & S. J. Page (Eds.), *Tourism and Transport; Issues and Agenda for the New Millennium* (pp. 157 - 169). Amsterdam: Elsevier.

Lumsdon, L., & Tolley, R. (2004). Non-Motorised Transport and Tourism; a Case Study - Cycle Tourism. In L. Lumsdon & S. J. Page (Eds.), *Tourism and Transport; Issues and Agenda for the New Millennium* (pp. 147 - 156). Amsterdam: Elsevier.

Mak, J., Carlile, L., & Dai, S. (2004). *Impact of Population Aging on Japanese International Travel to 2025* (No. 73). Honolulu: East-West Center.

March, R. (1997). Diversity in Asian Outbound Travel Industries; a Comparison between Indonesia, Thailand, Taiwan, South Korea and Japan. *International Journal of Hospitality Management, 16*(2), 231-238.

March, R. (2003). *The Japanese Travel Market; Update and Analysis. A Report into Changes in Australia's Most Important Inbound Market*. Australia: Inbound Tourism Studies Centre.

Marketing British Tourism. (2003). *Market Profile Japan*: Marketing British Tourism.

Mason, P. (1990). *Tourism; Environment and Development Perspectives*. Godalming: World Wide Fund for Nature.

McDonald, G., & Patterson, M. (2003). *Ecological Footprints of New Zealand and its Regions, 1997/98*. Wellington: Ministry for the Environment.

McDonald, G., & Patterson, M. (2004). Ecological Footprints and Interdependencies of New Zealand Regions. *Ecological Economics, 50*(1-2), 49-67.

McKenna, G. T. J. (1997). *To Boldly Go Where Everyone Has Gone Before; "Ugly Japanese" Tourism.* Unpublished a thesis submitted in partial fulfillment of the requirements for the degree of Masters of Philosophy in History, University of Auckland, Auckland.

Milner, L. M., Collins, J. M., Tachibana, R., & Hiser, R. F. (2000). The Japanese Vacation Visitor to Alaska; a Preliminary Examination of Peak and Off Season Traveler Demographics, Information Source Utilization, Trip Planning, and Customer Satisfaction. In K. S. Chon, T. Inagaki & T. Ohashi (Eds.), *Japanese Tourists; Socio-Economic, Marketing and Psychological Analysis* (pp. 43 - 56). New York: The Haworth Press.

Ministry for the Environment. (1997a). *First National Waste Data Report*. Wellington: Ministry for the Environment.

Ministry for the Environment. (1997b). *The State of New Zealand's Environment; Chapter Three Production and Consumption Patterns*. Wellington: MfE.

Ministry for the Environment. (2004). *New Zealand Packaging Accord 2004*. Wellington: MfE.

Ministry for the Environment. (2005). *About the Components of your Ecological Footprint*. Retrieved 2 June, 2005, from http://www.mfe.govt.nz/withyou/do/footprint/details.html#transport

Ministry for the Envisonment. (2004). *Reducing Packaging Waste; a Guide to the New Zealand Packaging Accord 2004*: Ministry for the Environment.

Ministry of Health Labour and Welfare. (2004, March). *Statistical Handbook of Japan; Chapter 12 Labour*. Retrieved 28 June, 2005, from http://www.stat.go.jp/english/data/handbook/c12cont.htm

Ministry of Tourism. (2004). *International Visitor Survey - Japan; YE September 2004*: Tourism Research Council New Zealand.

Ministry of Tourism. (2005a). *International Visitor Survey - Japan; YE March 2005*. Wellington: TRCNZ.

Ministry of Tourism. (2005b). *International Visitor Survey; YE March 2005*. Wellington: TRCNZ.

Ministry of Transport. (1995). *Greenhouse Gas Emissions from NZ Transport*. Wellington: Ministry of Transport.

Moffatt, I. (2000). Ecological Footprints and Sustainable Development. *Ecological Economics, 32*(3), 359-362.

Money, R. B., & Crotts, J. C. (2000). Buyer Behavior in the Japanese Travel Trade; Advancement in Theoretical Frameworks. In K. S. Chon, T. Inagaki & T. Ohashi (Eds.), *Japanese Tourists; Socio-Economic, Marketing and Psychological Analysis* (pp. 1 - 19). New York: The Haworth Press.

Muldoon, B., & Mattei, S. (2005, 1 July). *New York City's Yellow Cabs Go Green.* Retrieved 31 January, 2006, from http://www.sierraclub.org/pressroom/releases/pr2005-07-01a.asp

New Zealand Tourism Board. (1993). *Japan Market Brief.* Wellington: NZTB.

New Zealand Tourism Board. (1996a). *Japan Market Brief.* Wellington: NZTB.

New Zealand Tourism Board. (1996b). *Tourism in New Zealand, Strategy & Progress.* Wellington: New Zealand Tourism Board.

NFO New Zealand. (2002). *New Zealand International Visitor Survey; Results for the 12 Months to September 2002*: Tourism New Zealand and NFO New Zealand.

Nishiyama, K. (1996). *Welcoming the Japanese Visitor; Insights, Tips, Tactics.* Honolulu: University of Hawai'i Press.

Nozawa, H. (1992). A Marketing Analysis of Japanese Outbound Travel. *Tourism Management, 13*(2), 226-234.

OECD. (2001). *OECD Environmental Outlook.* Paris: Organisation for Economic Co-operation and Development.

Oyamada, T. (1982). The Japanese Abroad. In T. Larkin (Ed.), *Tourism from Japan; Prospects, Promise, Problems* (pp. 21 - 23). Wellington: Japan Advisory Committee.

Park, M. K. (2000). Social and Cultural Factors Influencing Tourists' Souvenir-Purchasing Behavior; a Comparative Study on Japanese "Omiyage" and Korean "Sunmul". In K. S. Chon, T. Inagaki & T. Ohashi (Eds.), *Japanese Tourists; Socio-Economic, Marketing and Psychological Analysis* (pp. 81 - 91). New York: The Haworth Press.

Patterson, M., & McDonald, G. (2004). *How Clean and Green is New Zealand Tourism? Lifecycle and Future Environmental Impacts* (No. 24). Lincoln: Landcare Research.

Peterson, C. H., & Lubchenco, J. (1997). Marine ecosystem services. In G. C. Daily (Ed.), *Nature's services; societal dependence on natural ecosystems* (pp. 177 - 194). Washington, DC: Island Press.

Plastics New Zealand. (2003). *NZ Waste & Recycling Statistics.* Retrieved 8 August, 2005, from http://www.plastics.org.nz/page.asp?id=502

Plimmer, N. (Ed.). (1982). *The Prospects, Promise and Problems of Tourism From Japan*. Wellington: Japan Advisory Committee.

Polunin, I. (1989). Japanese Travel Boom. *Tourism Management, 10*(1), 4-8.

Prime Minister's Office. (1997). *Heisei 9 nenban Kanko Hakusho [Tourism White Paper 1997]*. Tokyo: Prime Minister's Office.

Rees, W., & Wackernagel, M. (1996). Urban Ecological Footprints: Why Cities cannot be Sustainable-And Why They are a Key to Sustainability. *Environmental Impact Assessment Review, 16*(4-6), 223-248.

REINZ. (2005, December). Sales Statistics. *The New Zealand Property, 25,* 74 - 75.

Shimogiri, M. (2005, 7 August). Hueru "eco-hotel" gomi sakugen nado kuhuu, keihi herasu kouka mo [Increase of "Eco-Hotels" Manage to Reduce Waste etc, Cost Cutting Effect, too]. *Mainichi Shimbun [Japanese daily news paper]*.

South Pacific Tourism Organisation. (c1996). *Environmental Management Guide; for Small Hotels and Resorts*: South Pacific Tourism Organisation.

Speidel, J. J. (2002). Environment and Health; Population, Consumption, and Human Health. *Canadian Medical Association Journal, 5*(163), 551 - 556.

Statistics New Zealand. (2004, 6 December). *Electricity*. Retrieved 8 August, 2005, from http://www.stats.govt.nz/quick-facts/industries/electricity.htm

Statistics New Zealand. (2005a). *International Visitor Arrivals*. Wellington: Statistics New Zealand.

Statistics New Zealand. (2005b). *Tourism Satellite Account 2004*. Wellington: Statistics New Zealand.

Swarbrooke, J. (1999). *Sustainable Tourism Management*. New York: CABI Publishing.

Takamatsu, M., & Hayano, Y. (2004). *The Fundamentals of the Japanese Outbound Travel Market 2004*: Japan Tourism Marketing Co.

Templet, P. H. (2000). Externalities, Subsidies and the Ecological Footprint; an Empirical Analysis. *Ecological Economics, 32*(3), 381-383.

The Japan Times. (2005, July). Household Income Continued Decline to 5.8 Million Yen in '03. *The Japan Times*.

The World Bank. (2004). *Japan at a Glance*: The World Bank.

Tokushima Shimbun. (2005, 15 September). Pet bottle no kaishu ritsu donka; jichi-tai, seisan ni oitsukazu [Collecting Rate of Plastic Bottle Slow Down; the Self-Governing Body can not Catch up with the Production]. *Tokushima Shimbun [Japanese daily newspaper]*.

Tourism Australia. (2005). Market Briefing Japan: Tourism Australia.

Tourism New Zealand. (1999a). *100% Pure Vision*. Wellington: Tourism New Zealand.

Tourism New Zealand. (1999b). *Understanding the Japanese Long Haul Travel Market*. Wellington: Tourism New Zealand.

Tourism Research Council New Zealand. (2005a). *Commercial Accommodation Survey*. Wellington: TRCNZ.

Tourism Research Council New Zealand. (2005b, 27 April). *International Visitors Spent $6.3 Billion in 2004; Media Statement from the Ministry of Tourism.* Retrieved 27 May, 2005, from http://www.trcnz.govt.nz/Support/News+Releases/YE+December+2004+-+International+Visitor+Survey.htm

Tourism Research Council New Zealand, & The Ministry of Tourism. (2004). *Understanding the Dynamics of New Zealand Tourism*. Wellington: Tourism Research Council New Zealand & the Ministry of Tourism.

Transportation Association of Canada. (1999). *Transportation and Climate Change; Options for Action*: Transportation Association of Canada.

van den Bergh, J. C. J. M., & Verbruggen, H. (1999). Spatial Sustainability, Trade and Indicators: an Evaluation of the 'Ecological Footprint'. *Ecological Economics, 29*(1), 61-72.

Wackernagel, M., Linares, A. C., Deumling, D., Sanches, M. A. V., Falfan, I. S. L., & Loh, J. (2000). *Ecological Footprints and Ecological Sapacities of 152 Nations*. San Francisco: Redefining Progress.

Wackernagel, M., Monfreda, C., Deumling, D., & Dholakia, R. (2003, Feb). *Household Ecological Footprint Calculator*. Retrieved 17 June, 2005, from www.rprogress.org/newprojects/ecolFoot/faq/ef_household_0203.xls

Wackernagel, M., & Rees, W. E. (1997). Perceptual and Structural Barriers to Investing in Natural Capital: Economics from an Ecological Footprint Perspective. *Ecological Economics, 20*(1), 3-24.

Wackernagel, M., & Silverstein, J. (2000). Big Things First; Focusing on the Scale Imperative with the Ecological Footprint. *Ecological Economics, 32*(3), 391-394.

Wada, Y. (1999). *The Myth of 'Sustainable Development'; the Ecological Footprint of Japanese Consumption.* The University of British Columbia, Vancouver.

Waitakere City Council. (2000). *The Better Restaurant and Cafe Guide*. Waitakere: Waitakere City Council.

Watanabe, M. (1982). Receiving Japanese Visitors. In T. Larkin (Ed.), *Tourism from Japan; Prospects, Promise, Problems* (pp. 47 - 51). Wellington: Japan Advisory Committee.

Web Japan. (c2002). *Japan fact sheet*: Ministry of Foreign Affairs.

World Commission on Environment and Development. (1987). *Our common future*. Oxford ; New York: Oxford University Press.

World Tourism Organization. (2000). *Outbound Tourism of Japan; Market Profile* (No. 6). Madrid: World Tourism Organization Market Intelligence and Promotion Section.

World Tourism Organization. (2003, September). *Tourism and the World Economy*. Retrieved 7 April, 2005, from http://www.world-tourism.org/facts/tmt.html

Yamamoto, D. (2000). Packaging a Resort; an Analysis of Japanese Ski Holiday Package Tour Brochures. In K. S. Chon, T. Inagaki & T. Ohashi (Eds.), *Japanese Tourists; Socio-Economic, Marketing and Psychological Analysis* (pp. 115 - 127). New York: The Haworth Press.

Yasufuku, E. (2003). The Dynamics of Cross-Cultural Interaction in Tourism. In S. J. Epstein (Ed.), *Japan-New Zealand Tourism and Cross-Cultural Exchange* (pp. 19 - 26). Wellington: Asian Studies Institute of Victoria University.

You, X., & O'Leary, J. T. (2000). Age and Cohort Effects; an Examination of Older Japanese Travelers. In K. S. Chon, T. Inagaki & T. Ohashi (Eds.), *Japanese Tourists; Socio-Economic, Marketing and Psychological Analysis* (pp. 21 - 42). New York: The Haworth Press.

# Appendix 1. Survey Questionnaire

## A1.1 Survey Questionnaire in English

***Use of Resources by Japanese Tourists in New Zealand***

Please read the questionnaire carefully and choose the most appropriate answer or write down the answer.

**(1) What is your main reason for visiting New Zealand** (circle one)**?**

| | | |
|---|---|---|
| 1. Holiday | 2. Business | 3. Education |
| 4. Visit friends and family | 5. Other ..... | |

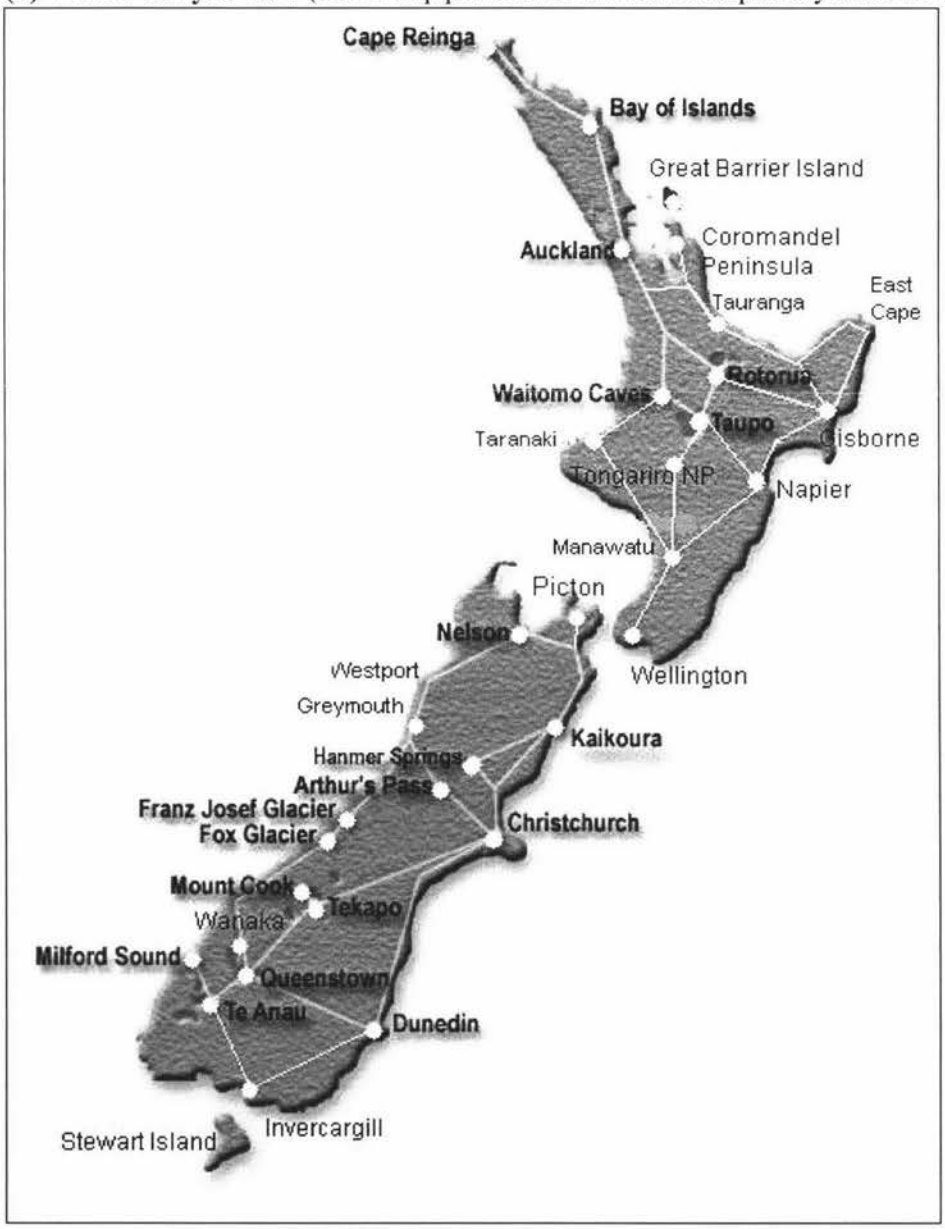
**(2) How many days did you stay in New Zealand**? .....days

**(3) How many members are there in your group or family?** .....

**(4) Did you usually share a room with friend(s) or family member(s) during your visit?**

1. Yes 2. No

**(5) Where did you visit** (on the map please circle all the dots of places you visited during your trip)**?**



**(6) How many nights did you stay at the following types of accommodation during your stay?**

| | Number of nights |
|---|---|
| (a) Hotels | |
| (b) Motel/ motor inn | |
| (c) B&B | |
| (d) Luxury lodge | |
| (e) Home stay | |
| (f) Farm stay | |
| (g) DOC hut | |
| (h) Camping ground/ caravan site | |
| (i) Apartment | |
| (j) Cabin/tourist flat | |
| (k) Backpacker/hostel | |
| (l) Student halls | |
| (m)Rented home/ flat | |
| (n) Private home of own/friend/family | |
| (o) Other ..... | |

**(7) Approximately how many times per week did you use the following facilities/ services during your stay** (or the total number of times if you stayed less than 1 week)**?**

| | Number of times per week |
|---|---|
| (a) Telephone | |
| (b) Fax | |
| (c) Post service | |
| (d) Laundry | |
| (e) Health club/ gym | |
| (f) Swimming pool | |
| (g) Spa pool | |
| (h) Bath tub | |

**(8) Approximately how much time** (in minutes) **did you spend per day using the following facilities/ equipment?**

| | Minutes per day |
|---|---|
| (a) Shower | |
| (b) TV | |
| (c) Video/ DVD | |
| (d) Computer/ internet | |
| (e) Heater | |
| (f) Kettle/ boiled water (for tea/coffee making) | |
| (g) Hair dryer | |

**(9) Please record both the average amount of time per day** (in hours) **and the number of days you have used the following methods of transport.**

| | Average time (in hours) per day | Number of days |
|---|---|---|
| (a) Coach bus (over 30 seats) | | |
| (b) Smaller bus (14-29 seats) | | |
| (c) Public/scheduled bus | | |
| (d) Car | | |
| (e) Mini-bus/ van | | |
| (f) Campervan (driving time) | | |
| (g) Taxi/shuttle bus | | |
| (h) Train | | |
| (i) Bicycle | | |
| (j) Domestic flight | | |
| (k) Ferry | | |
| (l) Other..... | | |

**(10) Tick the type of meal you usually have each day.**

| | | Please tick |
|---|---|---|
| (a) Breakfast | Continental meal (e.g., cereal/ toast) | |
| | Cooked meal | |
| (b) Morning tea | | |
| (c) Lunch | Cold meal (e.g., sandwiches, salad) | |
| | Hot/ cooked meal | |
| (d) Afternoon tea | | |
| (e) Dinner | Cold meal | |
| | Hot/ cooked meal | |
| (f) After dinner snack | | |
| (g) Other ..... | | |

**(11) On a typical day, how much of the following snack food items would you consume** (please answer either in quantity in the number OR value in JAP¥ or NZ$)**?**

| | Number (packs/ bottle) | Value of one of the items in JAP ¥ or NZ$ |
|---|---|---|
| (a) Soft drinks | | |
| (b) Juice | | |
| (c) Water bottle | | |
| (d) Chocolate | | |
| (e) Biscuits/cookies | | |
| (f) Chips | | |
| (g) Candies | | |
| (h) Chewing gum | | |
| (i) Other ..... | | |

**(12) Which of the following New Zealand made products did you purchase** (please answer either in quantity in the number OR value in JAP¥ or NZ$)**?**

| | Number of items | Total value in JAP¥ or NZ$ |
|---|---|---|
| (a) Wool/ sheep skin/ leather products | | |
| (b) Cotton products (e.g., T-shirt, towel) | | |
| (c) Wooden products (e.g., Maori carving) | | |
| (d) Jewellery/ accessory | | |
| (e) Cosmetics/ soap/ hand-cream | | |
| (f) Medicine/ health supplements | | |
| (g) Other ..... | | |

**(13) Which of the following best describes your travelling style?**

1. Full Package Traveller with escort (includes the international flights, all/most of domestic transportations, accommodations, food, & activities)
2. Package Traveller (includes the international flights and accommodations)
3. Semi-Independent Traveller (part of transportation and accommodation were organised prior to the trip )
4. Free Independent Traveller (all the itinerary was planned while travelling)
5. Other.....

**(14) Background Information**

(a) What is your gender? 1. Male 2. Female

(b) Which age group are you in?

0. Under 18 1. 19–23 2. 24–29 3. 30s 4. 40s 5. 50s 6. 60s 7. Over 70

(c) What is your occupation or profession? .....

**Thank you for taking the time to complete this questionnaire. The information you provided is extremely important for my research.**

## A1.2 Questionnaire in Japanese

*日本人旅行者のニュージーランドにおける資源利用*

アンケートを読んで、ニュージーランド旅行中のあなたの行動において最も当てはまる答えに○をつけるか、又は答えを書き込んでください。

**(1) 今回のニュージーランド旅行の主な理由は何ですか** (一つだけ選んで下さい)。

| | | | |
|---|---|---|---|
| 1. 休暇 | 2. 仕事 | 3. 教育 | 4. 家族・友人訪問 |
| 5. その他 ..... | | | |

**(2) ニュージーランドに何日滞在しましたか。** ..... 日

**(3) 何人の家族または友人と一緒にニュージーランドを訪れましましたか。**.....人

**(4) 滞在中、友人または家族と同じ部屋を共有しましたか。**

1. はい　　2. いいえ

**(5) どこを訪れましたか** (地図上で訪れた場所のすべての地名に○をつけてください)。

**(6) 滞在中、次の宿泊施設に何泊滞在しましたか。**

| | 宿泊日数 |
|---|---|
| (a) ホテル | |
| (b) モーテル・モーターイン | |
| (c) B&B (ベッド＆ブレックファスト) | |
| (d) 豪華ロッジ | |
| (e) ホームステイ | |
| (f) ファームステイ | |
| (g) 自然環境保護局(DOC)の山小屋 | |
| (h) キャンプ場・キャンピングカー宿泊所 | |
| (i) アパートメント | |
| (j) キャビン・旅行者用フラット | |
| (k) バックパッカーズ・ユースホステル | |
| (l) 学生寮 | |
| (m) 貸家・フラット | |
| (n) 個人宅 (自宅・友人宅) | |
| (o) その他..... | |

**(7) 滞在中に次の設備を一週間あたりおよそどのくらい** (平均回数) **利用しましたか** (一週間未満の旅行者の方は合計利用回数を記入してください)。

| | 一週間あたり平均使用回数 |
|---|---|
| (a) 電話 | |
| (b) ファックス | |
| (c) 郵便サービス | |
| (d) 洗濯・コインランドリー | |
| (e) スポーツクラブ・ヘルスセンター | |
| (f) プール | |
| (g) スパ・温泉 | |
| (h) 風呂 (湯船) | |

**(8) 滞在中に次の設備を一日あたりおよそどのくらい** (平均何分) **利用しましたか。**

| | 一日あたり平均使用時間 (分) |
|---|---|
| (a) シャワー | |
| (b) テレビ | |
| (c) ビデオ・DVD | |
| (d) パソコン・インターネット | |
| (e) ヒーター・暖房 | |
| (f) 湯沸しポット (コーヒー・茶用) | |
| (g) ヘアードライヤー | |

**(9) 滞在中, 次の移動手段をおよそどのくらい利用しましたか** (利用日数と その期間中の一日の平均移動時間を**両方**書き込んで下さい)。

| | 利用日数 | 一日の平均移動時間 (時間) |
|---|---|---|
| (a) 観光バス (30 席以上) | | |
| (b) 小型バス (14〜29 席) | | |
| (c) 公共バス | | |
| (d) 乗用車 | | |
| (e) ワゴン (6〜13 席) | | |
| (f) キャンピングカー | | |
| (g) タクシー・シャトル | | |
| (h) 列車 | | |
| (i) 自転車 | | |
| (j) 国内飛行機 (ニュージーランド内) | | |
| (k) フェリー | | |
| (l) その他 ..... | | |

**(10) 滞在中の典型的な食生活について、当てはまるものすべてに○を記入して下さい。**

| | | ○を記入 |
|---|---|---|
| (a) 朝食 | 軽い朝食 (シリアル・パンなど) | |
| | 調理された温かい料理 | |
| (b) 午前の間食 | | |
| (c) 昼食 | 軽い、又は冷たい食べ物 (サンドイッチ・サラダなど) | |
| | 調理された温かい料理 | |
| (d) 午後の間食 | | |
| (e) 夕食 | 軽い、又は冷たい食べ物 (サンドイッチ・サラダなど) | |
| | 調理された温かい料理 | |
| (f) (夕食後の) 夜食・おやつ | | |
| (g) その他 ..... | | |

**(11) 一日につき、次の種類の菓子・飲み物をおよそどのくらい消費しましたか** (個数あるいは金額どちらでも答えやすいものを書き込んで下さい)。

| | 数量 (袋・ボトル数) | 金額 (日本円または ニュージーランド・ドル) |
|---|---|---|
| (a) 清涼飲料水 | | |
| (b) 果汁ジュース | | |
| (c) 水・ミネラルウォーター | | |
| (d) チョコレート | | |
| (e) クッキー・ビスケット | | |
| (f) チップス | | |
| (g) 飴 | | |
| (h) ガム | | |

| | | |
|---|---|---|
| (i) その他…….. | | |

**(12) 次のニュージーランド産の製品をいくら購入しましたか** (個数あるいは金額どちらでも答えやすいものを書き込んで下さい)。

| | 購入個数 | 購入金額(日本円またはニュージーランド・ドル) |
|---|---|---|
| (a) ウール・ムートン・革製品 | | |
| (b) 木綿製品 (T シャツ・タオルなど) | | |
| (c) 木製品 (木彫り製品など) | | |
| (d) 宝石・アクセサリー | | |
| (e) 化粧品・石鹸・ハンドクリーム | | |
| (f) 薬 ・健康サプリメント | | |
| (g) その他 …… | | |

**(13) あなたの今回の旅行スタイルについて、最も当てはまるものを次の中から選んでください。**

1. 観光付きパッケージツアー (国際航空便とほぼ全ての移動手段、宿泊施設、食事、観光ツアーを含む)
2. パッケージツアー (国際航空便と宿泊施設を含むが、移動手段、食事、観光ツアーを含まない)
3. 自由旅行 ( 1 部の移動手段と宿泊施設は事前に予約済み)
4. 自由旅行 (すべての日程は旅行中に計画)
5. その他……

**(14) バックグランド**

(a) あなたの性別はどちらですか。　1. 男性　2. 女性

(b) あなたの年齢層はどれにあたりますか。

0. 18 歳以下　1. 19～23 歳　2. 24～29 歳　3. 30 歳代　4. 40 歳代　5. 50 歳代　6. 60 歳代　7. 70 歳以上

(c) あなたの職業は何ですか。 ……..

**アンケートに御協力いただき、ありがとうございました。提供していただいた情報は、この研究にとって大変貴重なものです。**

# Appendix 2. Travel itinerary for a pilot study tour.

New Zealand Trip Itinerary

| | |
|---|---|
| 07/02 (Mon) | 11:45 The group arrived at Auckland International Airport<br>12:00 Bus pick up (Tranzit Bus)<br>➢ Buffet lunch at restaurant in Centra Auckland Airport Hotel<br>➢ Auckland city general sight-seeing & One Tree Hill visit<br>15:30 Left Auckland, to Waitomo<br>➢ On the way to Waitomo, 1 stop at Service Station for toilet<br>19:00 Arrived at Waitomo Caves Hotel (School Road RD7, Waitomo Village, Otorohanga)<br>19:30 Dinner at Waitomo Caves Hotel ($45 pp set menu + drinks)<br>➢ Stayed at Waitomo Caves Hotel (2×triple, 4×twins. 1×single room) |
| 08/02 (Tue) | 7:00 Breakfast (Cooked Buffet) at the hotel ($17.50pp)<br>8:30 Left the hotel, to Waitomo Caves<br>9:00 – 10:00 Waitomo Glowworm Caves Tour<br>12:30 Huka Falls (15 min stop)<br>13:00 Lunch at Max Café in Taupo (order from the cabinet)<br>➢ Stopped in Taihape & Palmerston North for toilets<br>20:30 Arrived at Hotel in Wellington (Quest on Willis, 219 Willis St)<br>21:00 Dinner at Yangtze Restaurant (Chinese restaurant) (160 – 162 Willis St) - $50pp+ drinks<br>➢ Stayed at Quest on Wills Hotel (2×triple, 4×twins. 1×single room) |
| 09/02 (Wed) | 7:30 Breakfast at Epic Café (04 385 3314)<br>9:00 Depart the hotel to airport by shuttle bus (2 buses)<br>10:20 Departed Wellington Airport (NZ5019)<br>11:15 Arrived at Christchurch Airport, then Bus pick up (Ritchies Coachlines)<br>12:00 Lunch at Riverview Buffet Restaurant (794 Colombo St, Christchurch)<br>➢ After lunch, depart to Mt Cook<br>➢ Stop in Ashburton & Lake Tekapo, for toilet & sightseeing<br>18:30Arrived at Hermitage Aoraki Mount Cook (Mount Cook Village)<br>18:45Buffet Dinner at Alpine Restaurant ($49 pp+drinks)<br>22:30 – 23:30 Star watching tour at Mt Cook village<br>➢ Stayed at Hermitage Aoraki Mount Cook Motel (6 units) |
| 10/02 (Thu) | Breakfast at Coffee Shop in Hermitage Mt Cook Hotel<br>AM: Walk - from Mt Cook Camp ground to Kea Point walk track & Hooker Valley Track (to 2nd Swing Bridge return) |

| | |
|---|---|
| | Lunch at the coffee shop<br>➢ Free time to Dinner<br>18:45Buffet Restaurant at Alpine Restaurant ($49 pp + drinks)<br>➢ Stayed at Hermitage Aoraki Mount Cook Chalet (6 units) |
| 11/02<br>(Fri) | 10:00 Hotel Checked-out & depart<br>➢ Stopped at Lake Pukaki for sightseeing & toilet<br>12:00 Lake Tekapo sightseeing tour (Church of Good Shepherd)& shopping<br>13:00 Lunch at Lake Tekapo (Kohan Restaurant $18 lunch box)<br>➢ After lunch, departed to Christchurch<br>➢ Stopped in Geraldine for toilet<br>18:00Arrived at Hotel in Christchurch (Copthorne Christchurch Central, 776 Colombo Street, Christchurch)<br>19:00Dinner at Manee Thai Restaurant ($25 pp set menu + drinks) (241 Manchester St., Christchurch)<br>➢ Shopping after dinner<br>➢ Stayed at Copthorne Central Hotel Christchurch (2×triple, 4×twins. 1×single room) |
| 12/02<br>(Sat) | 7:30 Cooked Buffet Breakfast at the hotel ($20:90 pp)<br>AM: City walk/shopping<br>11:30 Lunch at China Town Yum Char (1st Floor, 71 Kilmore St, Christchurch)<br>13:00 Left hotel to airport by shuttle bus (2 buses)<br>14:15 Depart CHCH – AKL (NZ556)<br>15:35 Arrive AKL domestic & walked to international airport to check-in for an international flight<br>20:30 Depart Auckland to Japan (via Korea, Korean Airline) |

# Appendix 3. EFA Matrices

Ecological Footprints of Japanese Tourists in New Zealand (2005)



| | m | "m" for metric |
|---|---|---|
| No. of Japanese tourists: | 70 | |

| CATEGORIES | Units | AMOUNT per trip | FOSSIL ENERGY | CROPLAND | PASTURE | FOREST | BUILT-UP LAND | FISHERIES |
|---|---|---|---|---|---|---|---|---|
| **1.-FOOD** | | | **(results in uncalibrated global m2)** | | | | | |
| *% of food wasted rather than eaten* | | | 26% | | | | | |
| *How much of the food eaten is processed, packaged and not locally grown (from more than 200 miles (i.e., 320km) away)?* | | | d<br>50% | a. Most of the food I eat is processed, packaged, and from far away<br>b. Three quarters<br>c. Half<br>d. One quarter<br>e. Very little. Most of the food I eat is unprocessed, unpackaged and locally grown. | | | | |
| Veggies, potatoes & fruit | [kg] | 289.25 | 387 | 501 | | | | |
| Bread and bakery products | [kg] | 157.46 | 527 | 1,441 | | | | |
| Flour, rice, noodles, cereal products (exc | [kg] | 158.37 | 424 | 1,449 | | | | |
| Maize | [kg] | 4.00 | 11 | 22 | | | | |
| Beans and other dried pulses | [kg] | 3.74 | 5 | 99 | | | | |
| Milk, cream, yogurt, sour cream | [l] | 79.34 | 106 | 202 | 109 | | | |
| Ice cream, other frozen dairy | [l] | 0.40 | 1 | 1,268 | 3 | | | |
| Cheese, butter | [kg] | 99.53 | 866 | 2,536 | 1,362 | | | |
| Eggs [assumed to be 50 g each] | [number] | 596.50 | 100 | 682 | | | | |
| *Meat* | | | | | | | | |
| Pork | [kg] | 165.50 | 2,214 | 5,081 | | | | |
| Chicken, turkey | [kg] | 68.23 | 730 | 1,425 | | | | |
| Beef, lamb, venison | [kg] | 120.55 | 2,097 | 7,251 | 4,281 | | | |
| Fish & seafood | [kg] | 41.88 | 841 | | | | | 5,616 |
| Sugar | [kg] | 12.66 | 25 | 48 | | | | |
| Vegetable oil (seed or olive oil) | [l] | 7.74 | 25 | 421 | | | | |
| Margarine | [kg] | 5.39 | 22 | 366 | | | | |
| Honey | [kg] | 9.75 | 39 | 662 | | | | |
| Coffee & tea | [kg] | 16.13 | 140 | 712 | | | | |
| Juice & wine | [l] | 183.10 | 612 | 760 | | | | |
| Beer | [l] | 30.50 | 102 | 66 | | | | |
| **SUB-TOTAL-1** | | | **9,273** | **24,993** | **5,754** | **0** | **-** | **5,616** |
| **2.-HOUSING/ACCOMMODATION** | | | | | | | | |
| *Accommodations/infrastructures* | | | | | | | | |
| Accommodations | | | | | | | | |
| . Hotel (incl luxury lodge, motel with restaurant) | [guest night] | 275 | | | | | | |
| . B&B (incl farmstay, homestay, budget hotel, boat) | [guest night] | 361 | | | | | | |
| . Motel (without restaurant) | [guest night] | 30 | | | | | | |
| . Backpacker/YHA | [guest night] | 52 | | | | | | |
| . Campground (incl holiday park, hut, free camping) | [guest night] | 3 | | | | | | |
| . Home (incl private & rental home, flat, apartment) | [guest night] | 364 | | | | | | |
| Buildings & land for tourism | [m2] | 353 | 8,045 | | | 19,785 | 2,343 | |
| Current age of building | [years] | 25 | | | | | | |
| | | | | | | | | |
| *Energy* | | | | | | | | |
| Electricity | [kWh] | 21,434 | | | | | | |
| gas | | 22.6% | 10,596 | | | | | |
| coal | | 4% | 3,221 | | | | | |
| hydroelecric | | 65.4% | | | | | 2,522 | |
| wind | | 0.1% | | | | | 0 | |
| geothermal | | 6.3% | | | | | | |
| wood | | 1.1% | | | | | | |
| Natural gas, city | [m3] | 652 | 4,876 | | | | | |
| Liquid petroleum gas (propane) | [l] | 313 | 1,426 | | | | | |
| Firewood | [kg] | 78 | | | | 278 | | |
| Fuel oil, kerosene | [l] | - | - | | | | | |
| Coal | [kg] | 0 | 0 | | | | | |
| Water (not included since it depends on local circumstances) | [m3] | 219 | | | | 2,598 | | |
| **SUB-TOTAL-2** | | | **28,164** | **0** | **0** | **22,660** | **4,865** | **0** |
| 3.- TRANSPORTATION | | | | | | | | |
| Bus, transit (around town) | [pers.*km] | 3,851 | 4,403 | | | | 50.87 | |
| Bus, intercity | [pers.*km] | 62,727 | 7,782 | | | | 829 | |
| Train, transit (commuter, light rail) | [pers.*km] | 50 | 5 | | | | 416 | |
| Train, intercity | [pers.*km] | 2,666 | 246 | | | | 2,870 | |
| Car | [km] | 31,279 | 39,948 | | | | 37,191 | |
| average fuel efficiency | [liters] | 10 | | | | | | |
| Taxi & shuttle | [km] | 912 | 1,295 | | | | 1,085 | |
| average fuel efficiency | [liters] | 9 | | | | | | |
| Motorcycle | [km] | 0 | - | | | | - | |
| average fuel efficiency | [liters] | 4 | | | | | | |
| Airplane | [pers.*hours] | 111 | 35,272 | | | | | |
| (e)conomy, (b)usiness or (f)irst class? | | e | | | | | | |
| Sea Transport (ferry) | [pers.*km] | 525 | 451 | | | | | |
| **SUB-TOTAL-3** | | | **88,951** | **0** | **0** | **0** | **42,441** | **0** |

| 4.-GOODS | | AMOUNT per trip | FOSSIL ENERGY | CROPLAND | PASTURE | FOREST | BUILT-UP LAND | FISHERIES |
|---|---|---|---|---|---|---|---|---|
| Clothes and textiles | | | | | | | | |
| cotton | [kg] | 15.60 | 76 | 674 | | | 39 | |
| wool/sheep skin | [kg] | 19.68 | 96 | 924 | 612 | | 49 | |
| synthetic | [kg] | 0.00 | - | | | | - | |
| Wooden products | [kg] | 7.50 | 9 | | | 178 | 5 | |
| Plastic/metal products/ accessory | [kg] | 3.10 | 45 | | | | 23 | |
| Durable paper products (books) and hygienic paper products (toilet/tissue paper) | [kg] | 41.85 | 356 | | | 744 | 181 | |
| Leather products | [kg] | 4.32 | 21 | 236 | 139 | | 11 | |
| Porcelain, glass, candle | [kg] | 2.00 | 7 | | | | 4 | |
| Medicine/cosmetics | [kg] | 27.90 | 1,357 | | | | 689 | |
| Hygiene products, cleaning stuff | [kg] | 22.62 | 220 | | | | 112 | |
| **SUB-TOTAL-4** | | | **2,188** | **1,834** | **752** | **922** | **1,111** | **0** |
| **5.-SERVICES/ACTIVITIES** | | | | | | | | |
| Postal services | | | | | | | | |
| international | [kg] | 14.8 | 180 | | | | 176 | |
| domestic | [kg] | 1 | 2 | | | | 2 | |
| Dry cleaning or external laundry service | [$] | 500 | 730 | | | | 714 | |
| Telephone | [$] | 1494 | 363 | | | | 356 | |
| Medical services | [$] | 0 | - | | | | - | |
| *Entertainments/Attractions/Activities* | | 0 | | | | | | |
| .Museum/Art Gallery | [No. of visit] | 11 | 27 | | | | 26 | |
| .Ohter Buildings (historic sites, Parliament buildings, marae) | [No. of visit] | 101 | 86 | | | | 84 | |
| .Botanical garden | [No. of visit] | 3 | 6 | | | | | |
| .Zoo/wildlife/marine parks | [No. of visit] | 20 | 78 | | | | | |
| .Experience Centre | [No. of visit] | - | - | | | | - | |
| .Other Amusements (gondola ride, tram ride, Cable car) | [No. of visit] | 20 | 109 | | | | 107 | |
| .Farm Show | [No. of visit] | 27 | 46 | | | | 232 | |
| .Other Industry (other farm attraction, wine trail) | [No. of visit] | 10 | 28 | | | | 141 | |
| .Nature attraction (geothermal attraction, glow worm caves) | [No. of visit] | 59 | 122 | | | | 119 | |
| .Performance (cinema, concert, Maori performance, threatre) | [No. of visit] | 15 | 44 | | | | 43 | |
| .Other entertainment (bar, casino, shopping, sport) | [No. of visit] | 89 | 149 | | | | 146 | |
| .Scenic flights | [No. of visit] | 2 | 165 | | | | 162 | |
| .Other Air activity (air sports, whale watchng by air) | [No. of visit] | - | - | | | | - | |
| .Sailing | [No. of visit] | 1 | 34 | | | | 33 | |
| .Jet boating | [No. of visit] | 8 | 496 | | | | 486 | |
| .Boat cruises | [No. of visit] | 10 | 523 | | | | 512 | |
| .Other Motorised water activity (sea fishing, whale watching) | [No. of visit] | 3 | 173 | | | | 169 | |
| .Heliskiing | [No. of visit] | - | - | | | | - | |
| .Rafting | [No. of visit] | - | - | | | | - | |
| .Diving | [No. of visit] | - | - | | | | - | |
| .Other Adventure activities (bungy, climbing, kayak, mountain biking, luge, ski/snowboad,4WD sport) | [No. of visit] | 5 | 38 | | | | 38 | |
| .Guided walk | [No. of visit] | 11 | 294 | | | | 288 | |
| .Other Nature activities (cycling, dolphins, horse riding, golf, lake/river fishing, walking, wildlife, observatories) | [No. of visit] | 68 | 438 | | | | 429 | |
| Education | [$] | 6,900 | 5,036 | | | | 4,930 | |
| **SUB-TOTAL-5** | | | **9,168** | **0** | **0** | **0** | **8,975** | **0** |
| **6.- WASTE** | | | | | | | | |
| | | | | % recycled in NZ (national average) | | | | |
| paper and paperboard | [kg] | 518 | 3,636 | 39% | | 6,338 | 1,846 | |
| aluminum | [kg] | 27 | 1,444 | 12% | | | 733 | |
| other metal | [kg] | 137 | 1,888 | 36% | | | 959 | |
| glass | [kg] | 55 | 170 | 48% | | | 86 | |
| plastic | [kg] | 191 | 2,028 | 18% | | | 1,030 | |
| **SUB-TOTAL-6** | | **926.7** | **9,167** | **0** | **0** | **6,338** | **4,654** | **0** |

Note: The Ecological Footprint does not document our entire impact on nature. It only includes those aspects of our waste production and resource consumption that could potentially be sustainable. In other words, it shows those resources that within given limits can be regenerated and those wastes that at sufficiently low levels can be absorbed by the biosphere. For all activities that are systematically in contradiction with sustainability, however, there is no footprint, since nature cannot cope with them. There is no sustainable regenerative rate for substances such as heavy metals, persistent organic and inorganic toxins, radioactive materials, or bio-hazardous waste. For a sustainable world, their use needs to be phased out. In other words, the above footprint calculation assumes that the person being assessed engages in none of these systematically unsustainable activities, be it for example the release of CFCs, the unsafe disposal of motor oil, or the purchase, use and disposal of other harmful household chemicals.

# Supporting Data

| Footprint Intensity | Cropland [global m2/kg] | Pasture [global m2/kg] | Notes |
|---|---|---|---|
| Veggies, potatoes & fruit | 1.6 | | weighted avg: starchy roots, vegetables, fruits |
| Bread and bakery products | 8.3 | | same as "flour, rice, noodles..." |
| Flour, rice, noodles, cereal products (exc | 8.3 | | weighted avg. cereals (exc maize) |
| Maize | 5.0 | | |
| Beans and other dried pulses | 24.0 | | weighted avg. pulses |
| Milk, cream, yogurt, sour cream | 2.3 | 1.2 | milk |
| Ice cream, other frozen dairy | 11.6 | 6.2 | milk*5 |
| Cheese, butter | 23.2 | 12.4 | milk*10 |
| Eggs | 20.8 | | eggs |
| *Meat* | | | |
| Pork | 27.9 | | pigmeat |
| Chicken, turkey | 19.0 | | poultry meat |
| Beef | 54.7 | 32.3 | beef |
| Mutton, goat | 46.9 | 31.1 | mutton & goat |
| Fish | 121.9 | | weighted avg. fish, seafood |
| Sugar | 3.4 | | |
| Vegetable oil | 61.8 | | weighted avg. vegetables oils |
| Margarine | 61.8 | | based on vegetable oil |
| Coffee & tea | 40.1 | | weighted avg. coffe and tea |
| Juice & wine | 3.8 | | wine |
| Beer | 2.0 | | beer |
| Cotton | 39.3 | | cotton lint |
| Wool | | | |
| Cigarettes, other tobacco products | 13.6 | | tobacco |
| | Forest [global m2/m3 roundwood] | | |
| Timber | 6,469 | | |

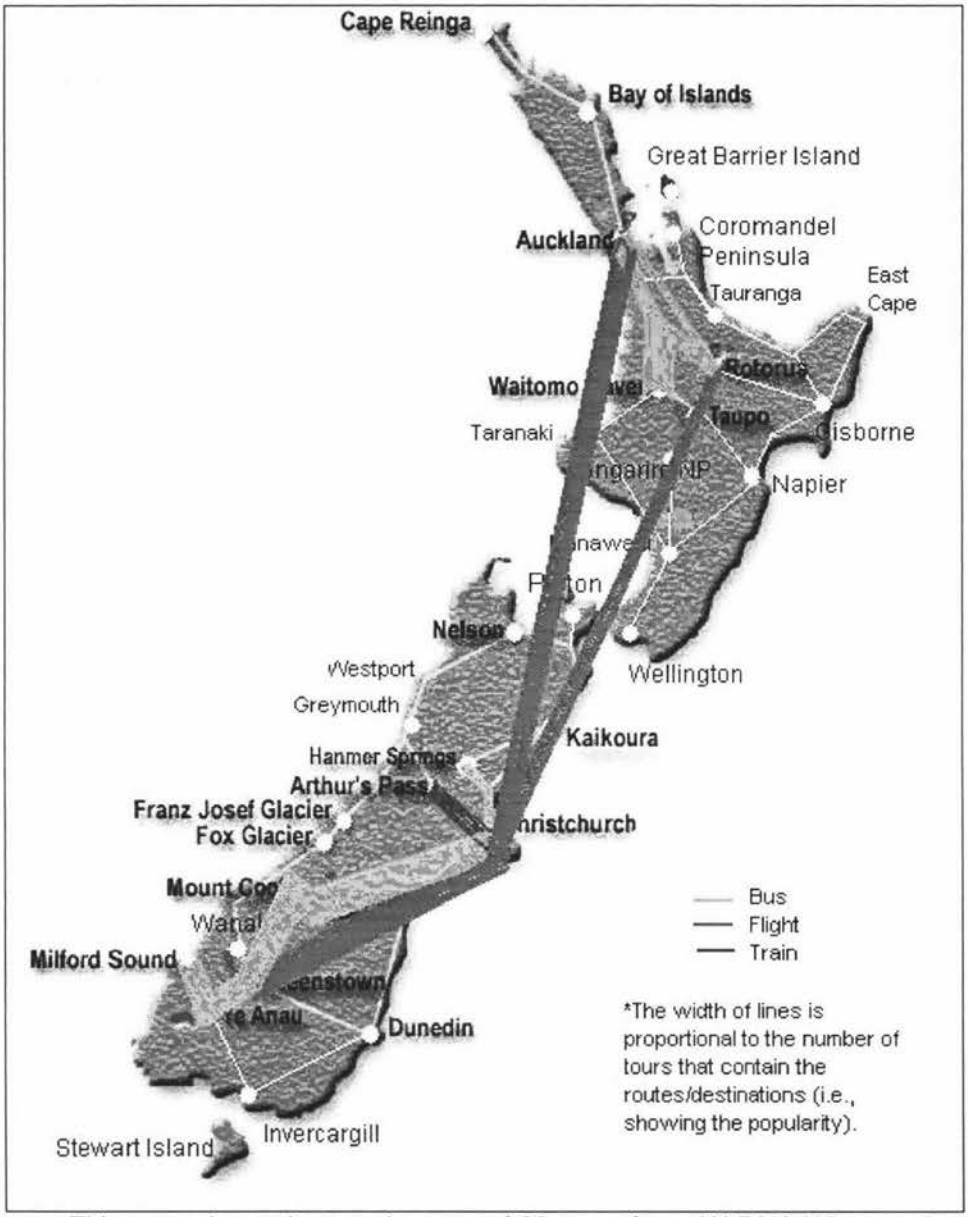
| Constants and Conversion Factors | |
|---|---|
| absorption rate [t C/ha/yr]: | 0.95 |
| % absorbed by oceans: | 35% |
| Carbon intensity [t C/GJ]: | |
| coal | 0.026 |
| oil (avg. fossil fuel) | 0.020 |
| natural gas | 0.015 |
| Carbon absorption factor [m^2/MJ]: | |
| coal | 0.18 |
| oil (avg. fossil fuel) | 0.14 |
| natural gas | 0.10 |
| Pre-purchase food loss | 1.1 |
| Structural consumption | 1.1 |
| Total built area of goods and waste (m2/cap) | 244 |
| Total built area of services (m2/cap) | 244 |
| Weight conversion (kg/lb) | 0.454 |
| Area conversion (acres/ha) | 2.47 |
| Area conversion (m^2/ft^2) | 0.093 |
| Volume conversion (l/qt) | 0.946 |

| Equivalence and Yield Factors & Footprint [m2] | Equivalence Factors [gm2/m2] | Yield Factors [ - ] | Unadjusted Footprint [m2] |
|---|---|---|---|
| FOSSIL ENERGY | 1.8 | 0.6 | 1,690 |
| CROPLAND | 3.2 | 2.1 | 188 |
| PASTURE | 0.4 | 5.2 | 433 |
| FOREST | 1.8 | 0.6 | 461 |
| BUILT-UP LAND | 3.2 | 2.1 | 267 |
| FISHERIES | 0.1 | 1.0 | 3,684 |
| **TOTAL** | - | - | 6,724 |

| Correction Factors for NZ | | FOSSIL ENERGY | CROPLAND | PASTURE | FOREST | BUILT-UP LAND | FISHERIES |
|---|---|---|---|---|---|---|---|
| FOOD | | 1.03 | 1 | 1.75 | | | 3 |
| HOUSING | | 0.98 | | | 1.60 | 0.78 | |
| TRANSPORTATION | | 0.73 | | | | 1.19 | |
| GOODS | | 4.73 | 4 | 2.16 | 2.91 | 0.33 | |
| SERVICES | | 4.21 | | | 3.52 | 0.33 | |
| WASTE | | 4.73 | | | 2.91 | 0.33 | |
| NZ average fossil fuel area of | goods: | 1,903 | services: | 1,652 | waste: | 1,283 | |

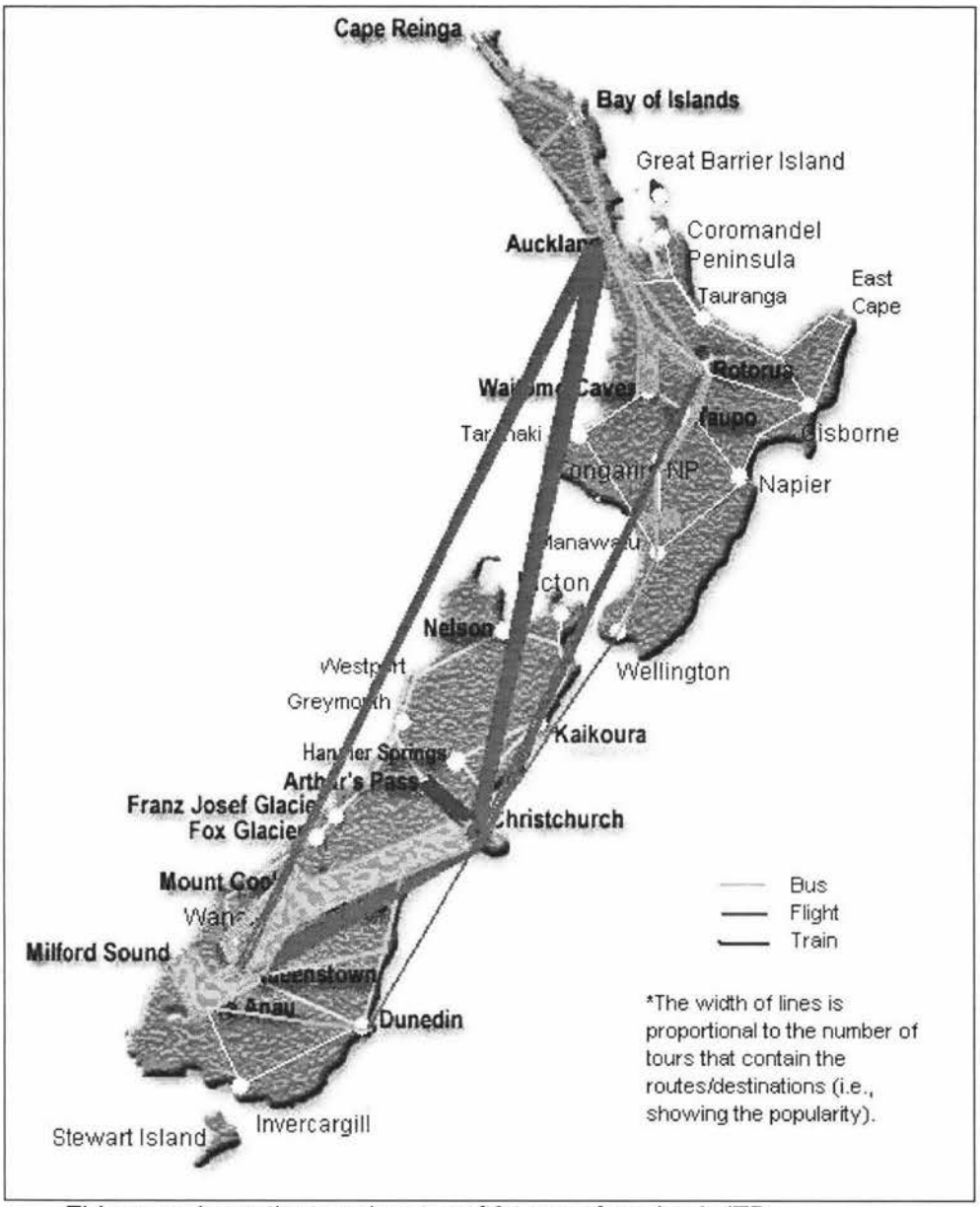
# Appendix 4. Escorted Tour Route

## A4.1 JALPAK



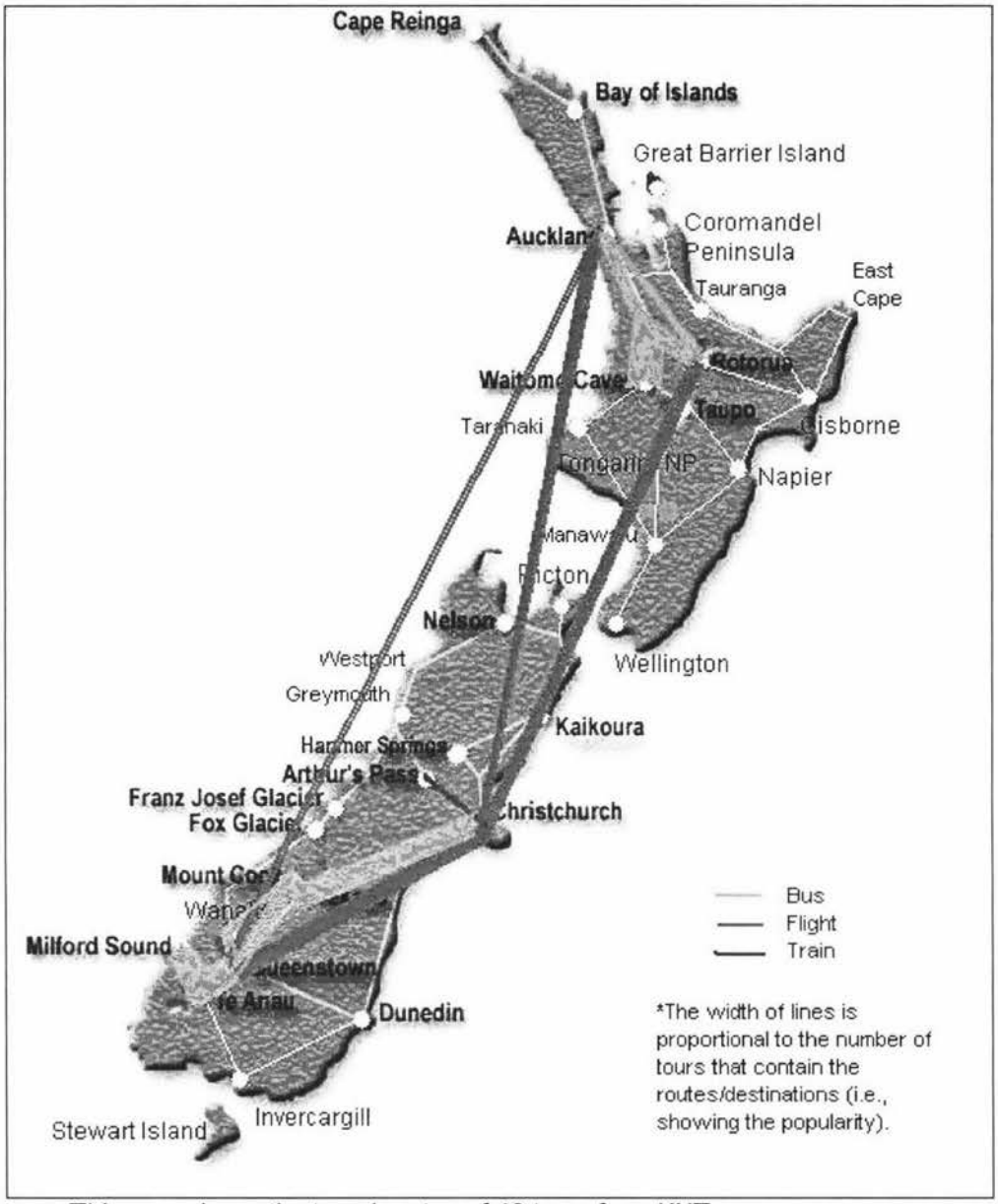

- This map shows the travel routes of 22 tours from JALPAK (15 tours depart from Tokyo and 7 depart from Osaka).
- Tour duration: 6 × 6 days, 5 × 7 days, 6 × 8 days, and 5 × 9 days.
- Main destinations: Auckland, Rotorua, Waitomo, Christchurch, Mt Cook, Queenstown, and Milford Sound.
- Some tours go to Hanmer Springs and Arthur's Pass, and one tour visit Te Anau.
- Overnight destinations: Auckland, Rotorua, Christchurch, Mt Cook, and Queenstown (only one tour stay in Te Anau and one in Hanmer Springs).
- Majority of transportation method is bus and domestic flight, and a few tours use train (between Christchurch and Hanmer Springs).

## A4.2 Look JTB



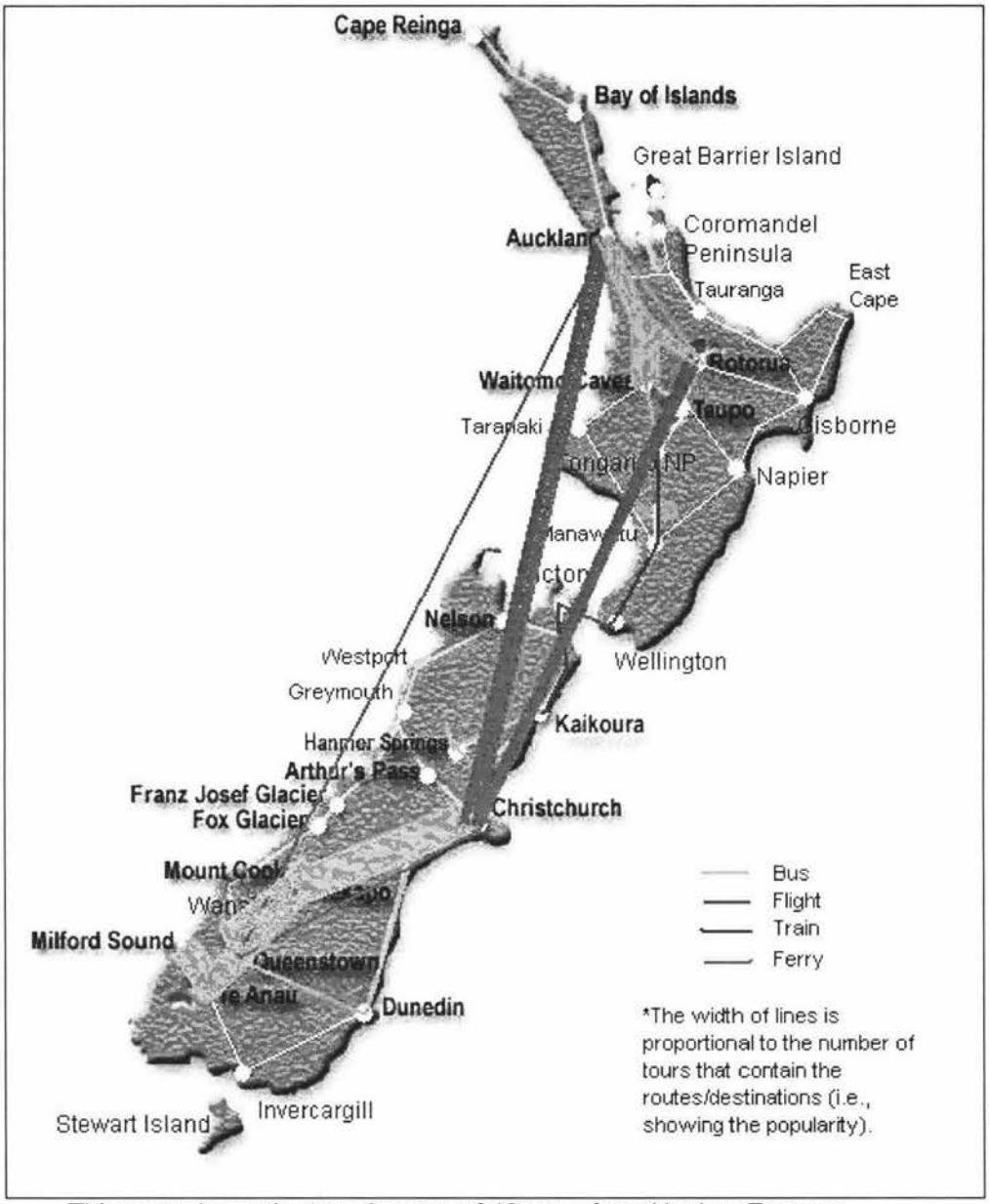

- This map shows the travel routes of 24 tours from Look JTB.
- Tour duration: 5 × 6 days, 5 × 7 days, 12 × 8 days, and 2 × 10 days.
- Main destinations: more in South Island (Christchurch, Mt Cook, Queenstown, and Milford Sound, and some Wanaka), but also Auckland, Rotorua, Waitomo,
- The travel routes are more diverse than other companies, also visiting Dunedin, Oamaru, Wellington, Tongariro NP, and Northland.
- Overnight destinations: Christchurch, Queenstown, Mt Cook, Rotorua, and Auckland (some tours stay in Wanaka, Te Anau and Paihia, and one tour each in Dunedin, Wellington, and Tongariro NP).
- Majority of transportation method is bus and domestic flight, and a few tours use train (between Christchurch and Hanmer Springs).

## A4.3 KNT Holiday




- This map shows the travel routes of 13 tours from KNT.
- Tour duration: 3 × 6 days, 2 × 7 days, and 8 × 8 days.
- Main destinations: Auckland, Rotorua, Waitomo, Christchurch, Mt Cook, Tekapo, Queenstown, and Milford Sound.
- Few other destinations such as Wanaka.
- Majority of transportation method is bus and domestic flight, and one tour uses train (between Christchurch and Hanmer Springs).

## A4.4 Hankyu Express




- This map shows the travel routes of 13 tours from Hankyu Express.
- Tour duration: 5 × 6 days, 7 × 8 days, and 1 × 11 days.
- Main destinations: Auckland, Rotorua, Waitomo, Christchurch, Mt Cook, Queenstown, and Milford Sound, but some tours also include Tekapo, Wanaka, Dunedin, Hanmer Springs, Kaikoura, Picton, Wellington, Tongariro NP, Maruia Springs, and Te Anau.
- The travel routes are more diverse than other companies.
- Main transportation methods are bus and domestic flight, but some tours also use train (both in North Island and South Island) and ferry.

# Appendix 5. Detail of individual EF

| Purpose of Visit | Travel Style | Individual No. | Gender | Age Group | Length of stay | Total EF (m2/day) | Fossil Energy | Crop land | Pasture | Forest | Built-up | Fisheries | Food | Housing/ accommo | Transport | Goods | Services |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Holiday | Escorted | A1 | Male | 50s | 5 | 409 | 198 | 32 | 11 | 58 | 71 | 39 | 92 | 76 | 144 | 12 | 26 |
| Holiday | Escorted | A2 | Female | 60s | 7 | 575 | 296 | 58 | 21 | 50 | 112 | 39 | 88 | 76 | 219 | 88 | 45 |
| Holiday | Escorted | A3 | Male | 40s | 5 | 595 | 398 | 54 | 17 | 53 | 34 | 39 | 94 | 78 | 219 | 97 | 49 |
| Holiday | Escorted | A4 | Female | 30s | 7 | 437 | 281 | 36 | 11 | 52 | 18 | 39 | 98 | 79 | 116 | 27 | 58 |
| Holiday | Escorted | A5 | Female | <18 | 8 | 432 | 228 | 74 | 19 | 50 | 22 | 39 | 118 | 78 | 87 | 64 | 26 |
| Holiday | Escorted | A6 | Female | 60s | 5 | 831 | 558 | 154 | 35 | 52 | 13 | 19 | 63 | 76 | 371 | 243 | 19 |
| Holiday | Escorted | A7 | Female | >70 | 8 | 749 | 469 | 64 | 21 | 53 | 121 | 19 | 95 | 75 | 431 | 54 | 33 |
| Holiday | Escorted | A8 | Female | 30s | 8 | 415 | 206 | 47 | 15 | 53 | 55 | 39 | 95 | 76 | 154 | 23 | 8 |
| Holiday | Escorted | A9 | Female | 50s | 7 | 362 | 230 | 29 | 9 | 52 | 11 | 29 | 77 | 79 | 118 | 16 | 13 |
| Holiday | Escorted | A10 | Male | 40s | 6 | 467 | 319 | 56 | 14 | 50 | 9 | 19 | 71 | 82 | 162 | 50 | 44 |
| Holiday | Escorted | A11 | Male | 40s | 6 | 413 | 225 | 64 | 11 | 62 | 12 | 39 | 94 | 70 | 82 | 52 | 55 |
| Holiday | Escorted | A12 | Female | 50s | 8 | 790 | 403 | 81 | 26 | 52 | 199 | 29 | 77 | 74 | 450 | 106 | 24 |
| Holiday | Escorted | A13 | Female | 60s | 7 | 458 | 300 | 55 | 16 | 53 | 15 | 19 | 80 | 84 | 151 | 27 | 56 |
| Holiday | Escorted | A14 | Male | 40s | 4 | 522 | 359 | 33 | 11 | 51 | 21 | 46 | 102 | 84 | 129 | 6 | 142 |
| Holiday | Escorted | A15 | Female | 60s | 5 | 651 | 378 | 132 | 31 | 50 | 21 | 39 | 105 | 75 | 113 | 185 | 114 |
| Holiday | Escorted | A16 | Female | 24 - 29 | 5 | 396 | 247 | 33 | 11 | 51 | 15 | 39 | 94 | 75 | 139 | 15 | 13 |
| Holiday | Escorted | A17 | Male | 60s | 7 | 493 | 345 | 32 | 11 | 52 | 14 | 39 | 92 | 79 | 134 | 78 | 50 |
| Holiday | Escorted | A18 | Male | 50s | 4 | 591 | 387 | 28 | 11 | 51 | 75 | 39 | 88 | 83 | 262 | 17 | 81 |
| Holiday | Escorted | A19 | Female | 50s | 5 | 369 | 221 | 32 | 11 | 50 | 17 | 39 | 93 | 75 | 38 | 5 | 100 |
| Holiday | Escorted | A20 | Male | 40s | 8 | 772 | 427 | 55 | 11 | 62 | 178 | 39 | 93 | 81 | 429 | 73 | 37 |
| Holiday | Escorted | A21 | Female | 50s | 7 | 411 | 240 | 54 | 11 | 53 | 15 | 39 | 93 | 80 | 70 | 40 | 69 |
| Holiday | Escorted | A22 | Male | 40s | 7 | 617 | 336 | 38 | 8 | 58 | 157 | 19 | 64 | 85 | 349 | 27 | 34 |
| Holiday | Package | A23 | Female | 24 - 29 | 7 | 461 | 293 | 37 | 8 | 50 | 54 | 19 | 84 | 70 | 230 | 6 | 12 |
| Holiday | Package | A24 | Female | 24 - 29 | 5 | 490 | 297 | 71 | 25 | 50 | 9 | 39 | 89 | 75 | 172 | 75 | 20 |
| Holiday | Package | A25 | Male | 40s | 9 | 493 | 275 | 31 | 10 | 50 | 88 | 39 | 86 | 74 | 211 | 12 | 50 |
| Holiday | Package | A26 | Male | 40s | 7 | 583 | 330 | 63 | 14 | 53 | 94 | 29 | 82 | 79 | 184 | 118 | 60 |
| Holiday | Package | A27 | Female | 40s | 4 | 360 | 131 | 82 | 28 | 52 | 27 | 39 | 91 | 74 | 41 | 80 | 14 |
| Holiday | Package | A28 | Female | 30s | 4 | 433 | 255 | 51 | 16 | 50 | 41 | 19 | 61 | 81 | 180 | 49 | 4 |
| Holiday | Package | A29 | Female | >70 | 4 | 546 | 264 | 130 | 41 | 50 | 41 | 19 | 61 | 81 | 180 | 162 | 4 |
| Holiday | Package | A30 | Female | 24 - 29 | 7 | 408 | 290 | 27 | 8 | 50 | 13 | 19 | 63 | 76 | 142 | 16 | 52 |
| Holiday | Package | A31 | Female | 24 - 29 | 6 | 549 | 319 | 38 | 4 | 50 | 128 | 10 | 47 | 75 | 220 | 74 | 73 |
| Holiday | SIT | A32 | Male | 60s | 8 | 882 | 372 | 31 | 11 | 51 | 379 | 39 | 91 | 69 | 637 | 5 | 21 |
| Holiday | SIT | A33 | Female | 50s | 6 | 208 | 130 | 20 | 5 | 49 | 4 | 0 | 31 | 51 | 56 | 5 | 7 |
| Holiday | FIT | A34 | Female | 30s | 14 | 286 | 117 | 17 | 4 | 49 | 97 | 0 | 27 | 49 | 123 | 17 | 9 |
| Holiday | FIT | A35 | Female | 30s | 14 | 298 | 126 | 20 | 5 | 50 | 97 | 0 | 31 | 53 | 123 | 23 | 9 |

| Purpose of Visit | Travel Style | Individual No. | Gender | Age Group | Length of stay | Total EF (m2/day) | Fossil Energy | Crop land | Pasture | Forest | Built-up | Fisheries | Food | Housing/ accommo | Transport | Goods | Services |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Business | SIT | A36 | Female | 50s | 8 | 501 | 223 | 31 | 8 | 50 | 170 | 19 | 62 | 73 | 291 | 10 | 6 |
| Business | SIT | A37 | Male | 40s | 11 | 168 | 100 | 11 | 3 | 49 | 5 | 0 | 17 | 46 | 31 | 5 | 10 |
| Business | SIT | A38 | Male | 24 - 29 | 7 | 722 | 405 | 38 | 5 | 50 | 225 | 0 | 50 | 76 | 518 | 6 | 14 |
| Business | FIT | A39 | Male | 40s | 6 | 930 | 356 | 105 | 34 | 51 | 347 | 39 | 97 | 67 | 582 | 109 | 15 |
| Business | FIT | A40 | Female | 30s | 180 | 187 | 79 | 26 | 8 | 50 | 4 | 19 | 62 | 50 | 6 | 5 | 5 |
| Business | FIT | A41 | Male | 30s | 7 | 791 | 389 | 24 | 8 | 53 | 298 | 19 | 60 | 78 | 571 | 12 | 11 |
| Business | FIT | A42 | Male | 30s | 20 | 392 | 227 | 33 | 11 | 52 | 31 | 39 | 94 | 84 | 74 | 17 | 63 |
| Business | FIT | A43 | Male | 30s | 10 | 1,381 | 588 | 48 | 8 | 50 | 687 | 0 | 64 | 59 | 1165 | 5 | 29 |
| Business | FIT | A44 | Female | 30s | 8 | 359 | 211 | 35 | 12 | 50 | 12 | 39 | 98 | 73 | 110 | 11 | 7 |
| VFR | Package | A45 | Female | 40s | 6 | 401 | 184 | 75 | 11 | 76 | 17 | 39 | 105 | 85 | 22 | 121 | 9 |
| VFR | Package | A46 | Female | 40s | 5 | 513 | 273 | 96 | 30 | 52 | 33 | 29 | 83 | 77 | 186 | 95 | 13 |
| VFR | SIT | A47 | Female | 50s | 6 | 688 | 333 | 109 | 36 | 51 | 150 | 10 | 45 | 77 | 334 | 157 | 16 |
| VFR | SIT | A48 | Female | 24 - 29 | 8 | 296 | 141 | 33 | 11 | 50 | 22 | 39 | 94 | 68 | 51 | 9 | 15 |
| VFR | SIT | A49 | Female | 40s | 10 | 719 | 327 | 37 | 8 | 50 | 277 | 19 | 66 | 48 | 516 | 16 | 13 |
| VFR | SIT | A50 | Female | 30s | 14 | 542 | 257 | 27 | 10 | 52 | 167 | 29 | 75 | 53 | 300 | 17 | 38 |
| VFR | SIT | A51 | Female | 50s | 17 | 621 | 267 | 29 | 10 | 53 | 234 | 29 | 77 | 71 | 390 | 8 | 16 |
| VFR | SIT | A52 | Male | >70 | 8 | 820 | 348 | 29 | 11 | 50 | 345 | 39 | 88 | 54 | 614 | 5 | 0 |
| VFR | SIT | A53 | Female | 50s | 7 | 333 | 157 | 91 | 8 | 51 | 7 | 19 | 136 | 53 | 57 | 19 | 8 |
| VFR | FIT | A54 | Female | 30s | 10 | 618 | 268 | 98 | 21 | 50 | 162 | 19 | 74 | 54 | 262 | 112 | 57 |
| VFR | FIT | A55 | Male | 50s | 20 | 374 | 151 | 39 | 9 | 51 | 95 | 29 | 71 | 52 | 154 | 22 | 16 |
| Education | SIT | A56 | Female | 24 - 29 | 110 | 356 | 246 | 29 | 8 | 51 | 23 | 0 | 42 | 60 | 12 | 10 | 173 |
| Education | SIT | A57 | Female | 24 - 29 | 15 | 324 | 199 | 25 | 8 | 49 | 24 | 19 | 60 | 60 | 36 | 29 | 79 |
| Education | SIT | A58 | Female | 40s | 6 | 506 | 345 | 23 | 3 | 52 | 74 | 10 | 44 | 78 | 286 | 24 | 15 |
| Education | SIT | A59 | Female | <18 | 5 | 419 | 209 | 56 | 6 | 54 | 94 | 0 | 40 | 86 | 154 | 55 | 25 |
| Education | FIT | A60 | Female | 24 - 29 | 14 | 375 | 248 | 25 | 8 | 50 | 25 | 19 | 61 | 61 | 30 | 5 | 160 |
| Education | FIT | A61 | - | - | 30 | 484 | 253 | 76 | 31 | 49 | 55 | 19 | 145 | 62 | 68 | 5 | 146 |
| Conferenc | SIT | A62 | Male | >70 | 6 | 286 | 114 | 51 | 18 | 50 | 15 | 39 | 123 | 76 | 22 | 5 | 2 |
| Wedding | SIT | A63 | Female | 30s | 10 | 662 | 382 | 54 | 8 | 52 | 147 | 19 | 85 | 79 | 333 | 31 | 73 |
| Working H | FIT | A64 | Female | 30s | 300 | 181 | 90 | 28 | 8 | 50 | 6 | 0 | 42 | 57 | 6 | 7 | 9 |
| School Exc | Escorted | A65 | Male | <18 | 5 | 293 | 210 | 20 | 5 | 50 | 8 | 0 | 31 | 66 | 115 | 9 | 13 |
| School Exc | Escorted | A66 | Female | <18 | 6 | 266 | 143 | 23 | 8 | 52 | 20 | 19 | 59 | 61 | 74 | 5 | 9 |
| School Exc | Escorted | A67 | Female | <18 | 6 | 195 | 99 | 31 | 8 | 49 | 8 | 0 | 41 | 55 | 16 | 14 | 10 |
| School Exc | Escorted | A68 | Female | <18 | 5 | 315 | 209 | 25 | 8 | 52 | 21 | 0 | 40 | 56 | 139 | 8 | 12 |
| School Exc | Escorted | A69 | Male | <18 | 6 | 198 | 97 | 29 | 9 | 55 | 7 | 0 | 47 | 53 | 16 | 13 | 10 |
| School Exc | Escorted | A70 | Male | <18 | 5 | 327 | 171 | 68 | 21 | 50 | 16 | 0 | 43 | 66 | 74 | 73 | 12 |
| Total | | | | | 1,131 | 34,293 | 18,548 | 3436 | 935 | 3,632 | 6,112 | 1,630 | 5,231 | 4,902 | 14,477 | 2,998 | 2,541 |
| Average | | | | | 16.2 | 489.9 | 265.0 | 49 | 13.4 | 51.9 | 87.3 | 23.3 | 74.7 | 70.0 | 206.8 | 42.8 | 36.3 |
| Median | | | | | 7.0 | 447.3 | 256.2 | 37 | 10.7 | 50.7 | 32.0 | 19.3 | 77.2 | 74.7 | 147.1 | 18.4 | 17.8 |
| Standard Deviation | | | | | 42.0 | 211.1 | 107.8 | 30 | 8.8 | 3.9 | 117.5 | 14.8 | 26.2 | 11.3 | 199.1 | 49.6 | 38.9 |
| Maximum | | | | | 300 | 1,381 | 588 | 154 | 41 | 76 | 687 | 46 | 145 | 86 | 1,165 | 243 | 173 |
| Minimum | | | | | 4 | 168 | 79 | 11 | 3 | 49 | 4 | 0 | 17 | 46 | 6 | 5 | 0 |