

Journal of Forest Products Business Research
Volume No. 4, Article No. 5

The Effect of Forest Context on Consumer Preferences for Environmentally Certified Forest Products in New Zealand and Australia

H.R. Bigsby and L.K. Ozanne

The authors are, respectively, Associate Professor, Commerce Division, P.O. Box 84, Lincoln University, Canterbury, New Zealand, email: bigsbyh@lincoln.ac.nz and Senior Lecturer, College of Business and Economics, Private Bag 4800, University of Canterbury, Christchurch, New Zealand, email: lucie.ozanne@canterbury.ac.nz.

ABSTRACT

The purpose of this study was to compare the effect of forest context on the relative importance of forest certification for New Zealand and Australian consumers. Surveys of New Zealand and Australian consumers were conducted to determine the relative importance of forest certification as compared to other wood product attributes in wood outdoor furniture. Using conjoint analysis, data for product attributes including price, forest certification, warranty, type of forest, and country of origin attributes from each group of consumers was analyzed. The results show that for Australian consumers, forest certification was ranked as being the second most important product attribute and for New Zealand consumers it was the third most important attribute. Forest type, with plantation sources being preferred to native forest sources, was the most important furniture attribute for Australian consumers. Region of origin was the most important attribute for New Zealand consumers and preference was given to New Zealand sources over imported sources. Warranty was ranked fourth in importance and price last by both groups. Cluster analysis shows that there are groups of consumers in each country that have similar preferences. The results also show that forest context is important; consumers in New Zealand are more likely to associate a local timber source with plantations since there is little harvesting of native forests. Australian consumers, on the other hand, expect the option of either a plantation or native forest source from domestic timber and therefore focus on forest type and forest certification.

Keywords: forest certification, conjoint analysis, cluster analysis

Introduction

In any country there will be a range of social, economic, and environmental factors that shape the way forests are managed and used. Sometimes referred to as the 'forest context', these factors are important in determining the type of forest policies and sectoral planning that is found in a country (Laarman and Sedjo 1992). Factors considered to be important include the relative importance of forestry in the economy, history of forest management, culture and traditions of forest use, and economic and political organization (Laarman and Sedjo 1992). Differences in these factors create

differences in forest contexts between nations, including the relative amounts of public and private ownership of forests, the degree of public regulation of forestry, and wood use.

One area of interest is the effect of forest context on public perceptions of forestry, particularly in terms of sustainability and the role of forest certification. Forest certification is a voluntary, market-based approach to promote sustainable forest management in which forests will be certified to have met particular environmental, social, and or economic criteria (Upton and Bass 1996). Forest certification is based on the premise that consumers are interested in sustainable forestry, and that when this interest is strong, it will cause consumers to discriminate their purchases in favor of certified forest products. As such, companies that can prove that they are environmentally responsible by being certified will benefit by differentiating their products and increasing their share in the marketplace. There have been a number of studies that have looked at the premise that consumers will discriminate in favor of environmentally friendly or environmentally certified wood products (Anderson and Hansen 2004a, 2004b; Anderson et al. 2005; Forsyth et al. 1997; Gronroos and Bowyer 1999; Kozak et al. 2004; Ozanne et al. 1999; Ozanne and Smith 1998; Ozanne and Vlosky 1997; Rametsteiner 2000; Veisten 2002).

These studies have also shown that there are differences between consumers in different countries in terms of how they perceive sustainability issues and forest certification. In terms of who consumers were most likely to trust as a certifying organization; Ozanne et al. (1999) found that New Zealand consumers would trust environmental organizations most and then the government; Ozanne and Smith (1998) and Ozanne and Vlosky (1997) found that U.S. consumers would trust private certification companies most and then environmental organizations; and Pajari et al. (1999) found that European consumers would trust environmental groups first and then national forestry interest groups. From a Canadian perspective, Archer et al. (2005) found that consumers were most trusting of a non-profit group, with only a small fraction placing trust in business organizations to substantiate certification claims. The question that arises is whether these differences in who is most trusted as a certifier are indicative of differences in forest context or differences in survey questions. Pajari et al. (1999) used the same survey in the United Kingdom, Germany, France, Italy, and Austria, and thus provided some indication of differences in forest context. Within their results, they identified that after environmental groups, national forestry interest groups are most trusted in Germany and competent national ministries are most trusted in France and Italy. They also found that support for a sustainable forest management label was highest in countries such as Italy where consumers were least satisfied with the domestic forest situation (e.g., stability of forest land area and forest health) and support for a mark of origin was highest in countries (Austria) where satisfaction with the domestic forest situation was highest. Veisten (2002) explored potential demand for certified wood products in the United Kingdom and Norway; however, respondents were asked to consider wood products containing wood originating from Nordic forests, thus the forest context under consideration was the same for both groups of respondents.

In a study similar to the one in this paper, Cooper et al. (1996) used a conjoint analysis approach to determine the relative importance of environmental information compared to three other product attributes for consumers from the United Kingdom and Greece. The United Kingdom and Greece were chosen for their study as they represented two countries at opposite ends of the continuum in terms of green issues. Their findings indicate the importance of environmental information, or an eco-label, is

in relative terms lower than the importance of other product attributes (price, species, style) for both country samples. In addition, their findings suggest that the importance of certain product attributes (e.g., price and style) is culture independent, while for other attributes (e.g., species and eco-labelling) there are significant inter-culture differences. They concluded “that utility values associated with some product attributes, i.e., price and style, appear to be common across the two samples, while utilities attributed to product attributes such as species and eco-labelling are country specific and are influenced by historical and cultural factors (p. 150).”

What has yet to be studied is the relative importance of forest certification between regions or countries with different ‘forest contexts’ when applied to a purchase decision for a wood product. New Zealand and Australia provide a good basis for this type of study because the countries are very similar in terms of culture and wood use. The key differences are in the source of timber (**Table 1**). While New Zealand has stopped all harvest of native timber on public land, there is still a significant harvest from native forests in Australia. As a result, the majority of wood products sold in New Zealand are from plantation sources, while in Australia consumers can still choose between plantation and natural sources. New Zealand is also a major exporter of wood products, while Australia remains a major importer. In addition, at the time of these studies, it was believed that there was a fairly high degree of awareness of the nature of the forest context in each country as the fate of the forests was being publicly debated. In Australia, this public debate was occurring between 1997 and 2001 when the commonwealth and state governments progressively signed the ten Regional Forest Agreements (RFA) (AFFA 2007). In New Zealand, the debate was occurring over a number of years and culminated in the Labour government deciding to stop the logging of all native forests (Gullette 2004).

Table 1. Forest context of New Zealand and Australia.

	New Zealand	Australia
Population ^a (million)	4.1	20.4
Per capita income ^b	24,738	31,425
Per capita lumber exports ^c (m ³)	0.440	0.012
Per capita lumber imports ^c (m ³)	0.012	0.034
Per capita lumber consumption ^c (m ³)	0.608	0.254
Forest share of total land area ^d	30%	21%
Forest area per capita ^e (ha)	2.0	8.1
Natural forest under harvest ^e (million ha)	0.1	11.4
Plantation forest area ^e (million ha)	1.8	1.7
Plantation share of total log production ^e	~100%	63%

^a IMF, 2005 estimate for Australia, official for New Zealand.
^b IMF, current international dollars using purchasing power parity in 2005.
^c FAOSTAT, 2005 values.
^d Plantation and natural forests, New Zealand Ministry of Agriculture and Forestry and Department of Agriculture, Forestry and Fisheries Australia.
^e New Zealand Ministry of Agriculture and Forestry and Department of Agriculture, Forestry and Fisheries Australia.

Two recent studies of the relative importance of forest certification compared to other wood product attributes in the decision-making process for outdoor furniture purchases have been done: one

in New Zealand (Biggsby and Ozanne 2002) and the other in Australia (Ozanne and Biggsby 2002). The product attributes used in these studies include forest type (natural forest or plantation), timber source (domestic or imported), forest certification (certified or not certified), price, and length of warranty. Forest type has already been shown to be important to consumers in New Zealand and Australia (Ozanne et al. 1999, Biggsby and Ozanne 2002, The Consultancy Bureau 1996), and other literature has shown the importance of country of origin in consumer decisions, particularly as it relates to product attributes (Verlegh and Steenkamp 1999, Peterson and Jolibert 1995). Since both of the studies used the same survey instrument, they provide an opportunity to compare the effect of forest context on the relative importance to consumers in New Zealand and Australia of forest certification compared to other important wood product attributes. Thus the purpose of this study was to compare the effect of forest context on the relative importance of forest certification between New Zealand and Australia.

Given the different forest contexts, statistical differences between New Zealand and Australian consumers are expected in terms of the relative importance of forest type, timber source, and forest certification. There are three hypotheses that can be formulated to test this proposition. Hypothesis 1 is that Australian consumers would find forest type (plantation) to be more important than New Zealand consumers because of the amount of timber available from natural forests in Australia. Hypothesis 2 is that New Zealand consumers, with almost all domestic timber coming from plantation sources, would find timber source to be more important than Australian consumers who have a mix of plantation and natural timbers from both domestic and imported sources. Hypothesis 3 is that Australian consumers, with more products from natural forests, would have a greater preference for certified products than New Zealand consumers who will almost always be purchasing plantation-grown products. Given the otherwise similar populations, it would be expected that there would be no difference in preferences for other product selection factors such as price or warranty.

The paper begins with a discussion of the methodology used, including the conjoint and cluster analysis and a discussion of how the data were collected and the sample frames and sampling procedures. The results section includes a demographic description of the samples and how they compare to the New Zealand and Australian populations and each other. Then the utility values and relative importance scores of the products attributes for both samples are provided. In order to test the hypotheses, tests of significance on the mean utility values for each attribute were conducted. Finally, in order to explore whether there are groups of consumers who value the attributes differently, the results of the cluster analysis are provided.

Methodology

The approach used in Biggsby and Ozanne (2002) and Ozanne and Biggsby (2002) is to evaluate the relative importance of product attributes by treating combinations of product attributes as a bundle that a consumer must compare to alternative bundles of attributes. The technique used to evaluate preferences for attribute bundles is the conjoint analysis (CJA) research methodology. CJA was developed in mathematical psychology and has been applied extensively in the marketing field (Green and Srinivasan 1990). A similar methodology was employed by Anderson and Hansen (2004a) to determine the relative importance of environmental certification compared to four other wood CD rack product attributes. In addition, Cooper et al. (1996) utilized CJA to determine the relative importance of environmental information compared to three other wood product attributes.

The principle behind CJA is that by providing consumers with a range of stimuli from among which to choose, inferences can be made about the value systems upon which their behavior is based. The word “conjoint” has to do with the fact that researchers can measure the values of stimuli jointly which otherwise might be poorly measured when taken one at a time. CJA is, therefore, concerned with measuring the joint effect of two or more independent variables on the ordering of a dependent variable. In the area of market analysis, it relates the buyer’s preferences to a set of pre-specified brand attributes. In addition, CJA determines the contribution of each attribute level to a buyer’s preferences.

Conjoint analysis assumes that the overall preference for a product, which represents the total utility or value of an object (U), can be expressed as a sum of utilities for its features or attributes (u_i) (Lehmann et al. 1998):

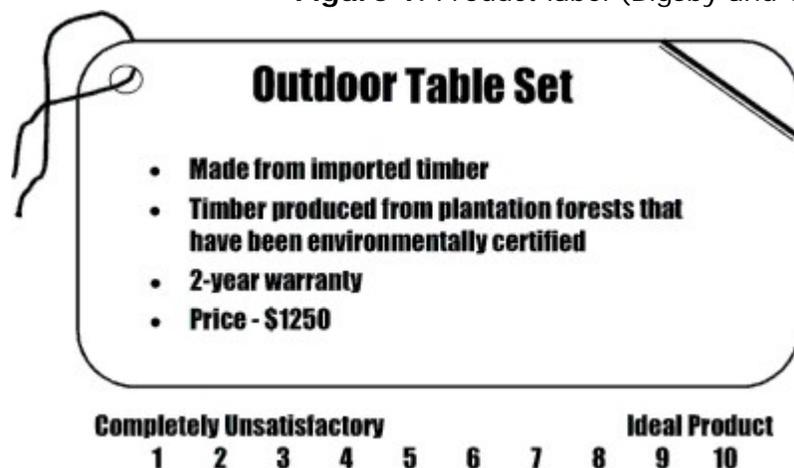
$$\text{Utility for an object (U)} = \sum_{i=1}^n u_i$$

The results of CJA provide a measure of the relative ranking of attributes across a population of respondents. Another common objective in this type of research is to segment the results into groups that have similar characteristics. In this case, each group would consist of consumers with similar rankings of outdoor furniture attributes. This is typically done using cluster analysis.

Cluster analysis is a term applied to a group of empirical techniques used for classification of objects without prior assumptions about the population (Punj and Stewart 1983). Cluster analysis attempts to identify and classify objects or variables so that each object is very similar to others in the cluster and very different from those outside the cluster (Green and Rao 1971). In this study, Q-cluster analysis technique was used to group respondents based on the importance they assigned to all product attributes considered simultaneously. In other words, cluster analysis provides information on whether respondents valued the furniture attributes in a similar fashion or whether there were segments of respondents with different preferences.

Data and Sampling

The conjoint sections of Bigsby and Ozanne (2002) and Ozanne and Bigsby (2002) were similar, with only minor changes to reflect a domestic timber source or local terminology. Respondents were asked to consider a purchase of a wood outdoor table and four chairs. They were provided with a drawing of the furniture, along with 12 different product labels (**Fig. 1**). Respondents were asked to treat the 12 labels as if they were the labels they would find attached to the furniture in a shop. Respondents were asked to rate each of the 12 labels on the information provided by circling the most appropriate number, where 1 equals a completely unsatisfactory product and 10 equals an ideal product.

Figure 1. Product label (Biggsby and Ozanne 2002).

Each label contained a combination of five product attributes, with two levels or values for each attribute (**Table 2**). The five attributes and levels were chosen on the basis of a survey of product labels in furniture stores. A standardized orthogonal design was used to construct the 12 different product labelling conditions (Green and Rao 1971). Respondents were asked to read all of the labels before beginning to rate them. They were also advised that they could assign the same rating to more than one label.

Table 2. Product attributes and levels.

Attributes	Level 1	Level 2
Price	\$1,000	\$1,250
Warranty	2-year	5-year
Timber source	Imported	New Zealand/Australia
Forest type	Natural/native	Plantation
Certification	No certification	Certification

To help clarify the labels, respondents were given definitions for the following terms: *natural or native forests* are naturally occurring forests that are managed for wood products as well as other uses such as recreation and wildlife habitat; *plantation forests* are planted commercial tree crops managed only for wood production; and *forest certification* means that an audit has been completed to ensure that the forests are managed in a sustainable manner and that the trees are harvested in an environmentally sound manner.

The populations of interest were New Zealand and Australian adults. To sample this population in New Zealand, a mailing list was generated by randomly selecting 500 names from the 1999 New Zealand Electoral Roll. Selecting the sample from the Electoral Roll ensured that respondents would be over the age of 18 and thus more likely to be in the potential target market for outdoor furniture. To sample this population in Australia, a mailing list of adults was purchased from an Australian database provider, who randomly selected 750 names from their database of adults, which included residents

from all over Australia. The different sample sizes were appropriate to reflect the differences in the size of the populations in New Zealand and Australia.

In both Bigsby and Ozanne (2002) and Ozanne and Bigsby (2002), data on the importance of wood product attributes was collected using mail surveys. Data from the New Zealand survey was collected in July and August of 2000 and in May and June of 2002 for the Australian survey. In adherence to the Total Design Method (Dillman 1978) survey guidelines, an initial survey mailing and a second mailing were conducted in order to maximize response rates. After adjusting the sample size for non-deliverable surveys and incomplete or otherwise unusable surveys, the adjusted response rate for the New Zealand survey was 35 percent and 26 percent for the Australian survey.

Nonresponse bias is often a common concern in survey research. Bias due to nonresponse can be evaluated by comparing those who respond to the initial mailing to those who respond as a result of subsequent mailings and other follow-up efforts (Armstrong and Overton 1977). From this procedure, nonresponse bias was found to be insignificant ($\alpha > 0.05$) in both the New Zealand and Australian data, across a range of variables examined from the survey.

Results

Analysis of the survey results is divided into three parts. The first part is a demographic comparison of the two samples. The second part is the conjoint analysis. This analysis focuses on the importance of attributes at the population level and highlights differences between Australian and New Zealand consumers. The third part of the results is the cluster analysis. This part of the results focuses on differences in population segments in both countries.

Demographics of Sample

The sample population of New Zealand and Australian consumers from the surveys were broadly representative of their wider populations. For the New Zealand sample, there was a slightly higher proportion of female respondents (60%) compared to the New Zealand population (51%). In terms of income, 70 percent of the sample had an annual income between \$20,000 and \$79,999 compared to 67 percent of the New Zealand population (New Zealand Census 2001). In terms of education, the New Zealand sample had a slightly higher educational level (46% high school education, 14% vocational or diploma, 12% undergraduate degree, 7% post-graduate degree) than the New Zealand population (34% high school education, 20% vocational or diploma, 8% undergraduate degree, 4% post-graduate degree) (New Zealand Census 2001). There was a much higher proportion of respondents between the ages of 30 and 65 years (80%) compared to the New Zealand population (45%) (New Zealand Census 2001); however, this difference was expected since the sample was drawn from the Electoral Roll (i.e., those 18 years and older).

For the Australian sample there was a slightly lower proportion of female