Preferences for certified forest products in Japan: A case study on interior materials

Yasushi Shoji [a,*], Nobuhiko Nakao [b], Yukari Ueda [b], Hiroaki Kakizawa [a], Takuro Hirai [a]

[a] *Research Faculty of Agriculture, Hokkaido University, Kita 9 Nishi 9, Sapporo, Hokkaido 060-8589, Japan*
[b] *Graduate School of Agriculture, Hokkaido University, Kita 9 Nishi 9, Sapporo, Hokkaido 060-8589, Japan*

ARTICLE INFO

ABSTRACT

The purpose of this study is to examine the preferences of Japanese consumers for certified forest products and estimate their price premiums using a discrete choice experiment. Although Japanese consumers have almost no opportunity to purchase forest certification products now, except paper and paper-related products, Japan may be a promising market with significant scope for increasing the demands for the forest certification products. Each choice task of our discrete choice experiment contained alternative wall renovation scenarios with interior wood materials showing five attributes. In 2008, 150 respondents living in Sapporo, northern Japan, completed our questionnaire, which contained a series of the choice tasks. To understand heterogeneous preferences and identify consumer segments in a systematic way, a latent class model was applied. The results show that the mean price premium on Forest Stewardship Council certification of interior materials was 40.5% under a ceteris paribus condition. However, two identified consumer segments both placed greater value on other attributes of the interior materials: dimensional stability and/or area of production. The results indicate that, for suppliers of forest products outside of Japan, the merit of forest certification and the demerit of foreign product will cancel each other out in Japan.

1. Introduction

1.1. Forest certification and its price premium

Forest certification is a system for promoting sustainable forest management through certifying forest products from properly managed forests according to a set of guidelines. In recent years, forest certification systems have accomplished global-scale developments, both in terms of the area of certified forests and the number of companies holding certificates. As of December 2012, for example, the forest area worldwide under Forest Stewardship Council (FSC) forest management certification was 169 million ha (FSC, 2012), and under the Programme for the Endorsement of Forest Certification (PEFC) scheme, the area under forest management certificates has expanded to 242 million ha (PEFC, 2012).

In response to global expansion of forest certification systems, many preceding studies examined consumer preferences for certified forest products (Aguilar and Cai, 2010; Aguilar and Vlosky, 2007; Anderson and Hansen, 2004a,b; Bigsby and Ozanne, 2002; Forsyth et al., 1999; Grönroos and Bowyer, 1999; O'Briena and Teisl, 2004; Ozanne and Vlosky, 1997, 2003; Teisl et al., 2002; Veisten, 2007; Vlosky et al., 1999). These previous studies have two main objectives. The first objective is to evaluate the price premiums for certified forest products. Many previous studies tried to evaluate price premiums not only for certification, but also for other attributes of forest products (e.g. areas of production). Ozanne and Vlosky (1997) evaluated the price premiums of US consumers for various forest products using a questionnaire survey, and they found that the price premiums range from 4.4% to 18.7% of noncertified basic prices. Bigsby and Ozanne (2002) also conducted a questionnaire survey to investigate the importance of the attributes of outdoor wood furniture; they showed that forest certification is the third most important attribute after the timber source (imported or domestic) and the forest type (natural or plantation). Other approaches, not based on questionnaire surveys, also supported positive price premiums, and consumers placed relatively high importance on certified forest products. Anderson and Hansen (2004b) and Teisl et al. (2002) indicated that forest certification influences consumers' choice, based on an experimental approach and a focus group approach, respectively. However, some studies have demonstrated that forest certification is not an important attribute of forest products, compared with other attributes (e.g. Bigsby and Ozanne, 2002; Forsyth et al., 1999).

The second objective is to understand heterogeneous preferences for certified forest products, including identification of consumer segments and specification of the source of heterogeneity. While Grönroos and

* Corresponding author. Tel.: +81 11 706 3342.
E-mail addresses: yshoji@for.agr.hokudai.ac.jp (Y. Shoji), nobuhiko@for.agr.hokudai.ac.jp (N. Nakao), ueda-y@for.agr.hokudai.ac.jp (Y. Ueda), kaki@for.agr.hokudai.ac.jp (H. Kakizawa), hirai@for.agr.hokudai.ac.jp (T. Hirai).

Bowyer (1999) pointed out the relatively low importance of forest certification as an attribute for forest products, they indicated that forest certification is important for some specific consumer segments. That is, even a low price premium does not necessarily mean that forest certification is insignificant for marketing. Instead, forest certification can be considered significant to particular segments in the market. In that case, identification of consumer segments is important for the marketing of certified products. Bigsby and Ozanne (2002), for instance, identified four consumer segments, and showed that one of them regarded forest certification as a key attribute of forest products. Ozanne and Vlosky (1997) identified five consumer segments, and demonstrated that one segment, which gave the highest grade to the forest certification attribute, included more women, liberalists and members of environment conservation groups.

1.2. Valuation method for price premium

Over the past few decades, several approaches have been used to estimate the price premiums of certified forest products. The most basic approach for estimating the price premiums of certified forest products is to directly survey consumers about their price premiums (Forsyth et al., 1999; Ozanne and Vlosky, 1997, 2003). Ozanne and Vlosky (1997), for example, asked respondents their maximum permissible price premium for a noncertified two-by-four piece of lumber with one US dollar. Conjoint analysis has also been used to estimate the price premium of certification (Aguilar and Cai, 2010; Anderson and Hansen, 2004a; Bigsby and Ozanne, 2002). Conjoint analysis is a set of techniques for measuring tradeoffs among multiattribute goods and services, and has received considerable academic and industry attention, especially in the marketing field (Green and Srinivasan, 1978, 1990). This approach enables us to compare price premiums across certification and the other attributes of forest products.

It has been recognized that environmental valuation techniques, such as the contingent valuation method and discrete choice experiment (DCE) in the field of environmental economics, are also powerful approaches for estimating price premiums. The contingent valuation method was developed originally to estimate the monetary valuation of environmental resources, and is frequently applied to estimate nonuse values (Carson and Hanemann, 2005; Mitchell and Carson, 1989). DCE is often regarded as one of a family of conjoint analysis techniques in some cases. However, DCE is characterized by measures of choice, rather than ratings or rankings, and modeled by random utility theory. Therefore, in other cases, DCE is distinguished as being a different method from conjoint analysis in respect to consistency with economic theory (Louviere et al., 2010). The estimated marginal willingness to pay (MWTP) for attributes of forest products by DCE can be defined as compensating variation; therefore, their price premiums can be regarded as consistent valuations in economic theory. This also holds true for estimated willingness to pay using a dichotomous choice CVM (Hanemann, 1984). For example, Veisten (2007) applied CVM and DCE to estimate the willingness to pay for eco-labeled wood furniture and compared their estimates.

1.3. The purpose of this study

The purpose of this study is to understand the preferences for forest products with certification and to evaluate their price premiums using DCE with a latent class model (LCM), which incorporates a membership function into the choice model. This paper distinguishes itself from the abovementioned previous studies by focusing on two distinct points of view. First, this paper takes a different integrated approach from these previous papers toward modeling choice behaviors and identifying segmentation simultaneously. LCM allows us to incorporate not only the attributes of wood products, but also the membership variables related to the characteristics of individual respondents, such as psychometric or socioeconomic effects, into choice models.

Second, this paper has important consequences for evaluating the price premium for certified forest products of Japanese consumers. Previous studies have focused mainly on cases in North American, European and Oceanian countries, and little attention has been given to cases in other regions (Aguilar and Cai, 2010). Although Owari and Sawanobori (2007) analyzed the current market trends for certified forest products in Japan by a survey of certified companies, to the best of our knowledge, there has been no study that has tried to value quantitatively the consumers' price premium for certification. Japan is one of the foremost timber-importing countries from all over the world. For example, Japan imported the world's largest amount of plywood and the third-largest amount of sawn wood after China and the US in 2010 (FAO, 2012). To understand worldwide trends in the market for certified forest products, Japanese preferences for forest certification need to be examined. Japanese consumers have almost no opportunity to purchase forest certification products now, except paper and paper-related products. Certified wood and wood-based materials, however, will possibly become popular in the Japanese market in addition to paper and paper-related products with a future shift in policy and consumer preferences.

The remainder of the paper is structured as follows. In Section 2, we outline our estimation models, questionnaire design and survey. In Section 3, we present the descriptive statistics and empirical estimates of our conditional logit model and LCM using our survey data. Finally, Section 4 interprets the estimated results and discusses possible marketing strategies for forest certification in Japan.

2. Methodology

2.1. Literature review on DCE

DCE was initially developed by Louviere and Hensher (1982) and Louviere and Woodworth (1983) and is one option in a family of stated preference approaches (Louviere et al., 2000). DCE allows individual preferences to be assessed by asking respondents to choose among various multiattribute scenarios; the method is widely used in marketing, transportation and environmental valuation and so forth (Adamowicz et al., 1999; Hensher, 1994; Louviere, 1994). Here, we are also concerned with consumer segmentation associated with heterogeneous preferences. Over the past few decades, studies have focused on modeling heterogeneous preferences or identifying consumer segmentation for goods and services (e.g. Wedel and Kamakura, 2000). Among many approaches, LCM in the context of DCE, which estimates the part-worth utility for each segment and the probability that each respondent belongs to each segment, has been receiving increasing attention.

Previous models have attempted to explain choice behaviors and segmentation separately. For example, preceded by a choice model, multivariate cluster analysis of psychometric or socioeconomic characteristics is sometimes applied. Although the choice models estimated separately for each cluster were statistically superior to a model that pools the clusters, there must be a priori knowledge of the elements of heterogeneity. Difficulty in modeling heterogeneous preferences comes from the fact that individual-specific characteristics, which are considered to be the main source of heterogeneous preferences, are constant across choice alternatives. In the context of DCE within a random utility framework, this makes it impossible to obtain coefficient estimates of individual-specific characteristics because all the constants will be canceled out. For this reason, previous studies have introduced clever interaction terms between individual-specific characteristics and choice attributes (e.g., Morey et al., 2002). However, these methods are also limited because they require a priori selection of key individual characteristics and attributes, and only involve a limited selection of individual specific variables (Boxall and Adamowicz, 2002). While the