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Market segmentation and analysis of Japan's residential post and beam construction market

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Abstract

A mail survey of Japanese post and beam builders was conducted to measure their level of ethnocentrism, market orientation, risk aversion, and price consciousness. The data were analyzed utilizing factor and cluster analysis. The results showed that Japanese post and beam builders can be divided into three distinct market segments: *open to import*, *low price sensitivity*, and *conservative*. A demographic profile of the *open to import* segment revealed that they are relatively newer companies, highly price sensitive, composed of larger builders, and targeting the lower end affordable housing market. This market segment was also found to be stronger in Japan's urban regions and weaker in the Kyushu region. Managerial implications for how exporters can target the *open to import* segment are discussed.

The Japan forest products export market has become extremely competitive for North American firms. This increased competitiveness can be partially explained by a decrease in demand coupled with an increase in the number of supplier countries. On the demand side, Japanese annual housing starts from 2000 to 2003 averaged 1.16 million units, 18 percent below the 1990s average of 1.44 million units (JAWIC 2004). On the supply side, Europe, Russia, New Zealand, and Chile entered the market in force during the 1990s and have consistently been increasing their market share (Eastin et al. 2002). During this same period, demand shifted from green lumber to kiln dry lumber and engineered wood products (Gaston et al. 2000). A large body of literature has developed investigating Japan's 2 by 4 builder market seg-

ment (Roos and Eastin 1998; Eastin et al. 1999; Hashizume and Eastin 2000). However, few empirical studies exist that examine the Japanese post and beam market segment, which comprises approximately 83 percent of all wood housing starts.

The objectives of this study are to analyze and segment Japan's post and beam builder market for wood building materials based on four constructs: ethnocentrism, market orientation, risk aversion, and price sensitivity. The data pre-

sented will help North American lumber and building materials exporters better understand the unique market segments that exist within Japan's residential post and beam construction market, identify where these market segments exist, and develop more effective strategies to target these market segments. The four constructs and their supporting literature are first discussed and then utilized in a cluster analysis to segment Japan's residential construction post and beam market.

Background

The authors conducted a review of the marketing and international trade literature to identify constructs that could help identify Japanese builders that would be more likely than other builders to import forest products. The following four constructs were identified and adapted to measure the attitudes of Japanese builders.

Ethnocentrism

Consumer ethnocentrism is defined in the marketing literature as the beliefs held by consumers about the "appropriateness, indeed morality, of purchasing foreign made products" (Shimp and

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Sharma 1987). Ethnocentric consumers consider purchasing foreign products as wrong because it causes job loss, hurts the domestic economy, and is "unpatriotic." In contrast, non-ethnocentric consumers judge imported products on the product's attributes rather than on where the product was manufactured. Shimp and Sharma (1987) developed a scale called the CETSCALE to measure the level of consumer ethnocentrism. The validity and reliability of the CETSCALE have been established in the United States, France, Japan, and Germany (Netemeyer et al. 1991). Empirical research has shown that the CETSCALE has strong cross-cultural discriminant ability (Durvasula et al. 1997).

A consumer's level of ethnocentrism has been found to have an inverse relationship with social consciousness (Marcoux et al. 1997); this research also replicates earlier studies that have found patriotism to be positively correlated with ethnocentrism. Further empirical evidence showed that low ethnocentric consumers are more likely to associate product quality cues with country of origin than do high ethnocentric consumers (Brodowsky 1998). Additionally, ethnocentric consumers showed negative responses to international advertising campaigns (Moon and Jain 2001).

Ethnocentrism is important to research within the context of Japan's residential construction industry because it measures how open builders are to using imported forest products. Ethnocentrism in this study was measured by adapting the CETSCALE to fit Japan's post and beam market builder segment.

Market orientation

The goal of marketing is to discover needs and wants of customers and to satisfy those needs and wants through market segmentation, product differentiation, and targeting. The marketing literature has defined the degree of marketing philosophy within a firm as "market orientation." During the 1990s, a large body of literature was devoted to market orientation. Kohli and Jaworski (1990) proposed three themes of market orientation: 1) customer focus; 2) coordinated marketing; and 3) profitability. They then went on to develop the MARKOR Scale, which measures firm market orientation (Kohli et al. 1993).

This scale encompasses measures for generation of market intelligence, dissemination of intelligence, and respon-

siveness to market intelligence. Marketing researchers have also examined the relationship that exists between degrees of market orientation and firm performance. Narver and Slater (1990) found that market orientation had a positive effect on firm profitability. They also found that this positive relationship holds up in competitive environments (Narver and Slater 1994). Han et al. (1998) found that market orientation facilitates innovativeness, which then positively affects business performance. The positive market orientation/business performance relationship was also found to be strong in developing economies (Subramanian and Gopalakrishna 2001).

Market orientation is important to research within Japan's residential construction industry because, if there is a market segment that is market oriented, this offers exporters the opportunity to differentiate themselves by pursuing co-marketing relationships with Japanese importers. Market orientation was measured in this study using an adapted synopsis of the MARKOR scale.

Risk aversion

There is a level of perceived risk for some post and beam builders that arises from using imported products. Some concerns mentioned in an interview with a Japanese forest products broker were product performance in Japan's humid environment, the ability of non-Japanese firms to guarantee residential building products for 10 years as required by Japanese law, and resins used in laminated products that may be harmful to humans (Enokido 2001).

Several studies have shown that firms that take risks and enter markets early gain a long-term market share advantage defined as the "Market Pioneer Advantage" (Robinson and Fornell 1985, Urban et al. 1986). The Market Pioneer Advantage is built on brand loyalty, high switching costs, and scale economies (Kerin et al. 1992). Increased levels of expertise in a given field were found to have a negative correlation with risk levels associated with new product adoption (Moreau et al. 2001).

Regardless of the perceived risks associated with using imported products, many opportunities exist for post and beam builders to differentiate themselves through offering unique imported materials. Examining the risk acceptance level within the Japanese post and beam market segment is important because mar-

keting tools can be used to mitigate the perceived risks. These tools include front-end discounts, back-end rebates, brand extension, increased technical support, and product warranties. Risk aversion was measured in this study by adapting the scale developed by Price and Ridgway (1983).

Price sensitivity

One of the most important marketing decisions facing a firm is how to price a product or service. Empirical research has shown that there is an inverse relationship between price and the perception of quality in certain markets (Lichtenstein et al. 1988). This implies that a firm could unintentionally position itself as an inferior product by pricing too low in certain markets. On the other hand, Japan's prolonged economic recession has moved many consumers from an "expensive is better" to a "bargains are better" philosophy (McGowan and Sternquist 1998).

Regardless of the importance of pricing strategy, studies have shown that few firms research pricing attitudes in their target markets (Monroe and Cox 2001). One study showed that exporters generally do not have a systematic approach for pricing strategy even though they rated pricing strategy as a key to export success (Stottinger 2001). One of the goals of this study is to provide a price sensitivity benchmark for the post and beam market segment so that exporters can build a more effective pricing strategy.

Price consciousness is a construct that describes how sensitive consumers or businesses are to price. This is similar to the price elasticity concept of economics. A scale for measuring price consciousness was developed by Dickerson and Gentry (1983). A similar scale was later developed with the added dimensions of "reliance on price" and propensity to purchase "the lowest priced item" to suit a need (Lichtenstein et al. 1988). These two scales were combined and modified to measure the price sensitivity of Japanese residential construction builders.

Survey design and methodology

The survey was drafted in English and then translated into Japanese by a native Japanese speaker. The Japanese translation was then checked against the original English draft for consistency by two

Table 1. — Respondent size by annual sales in yen ($n = 457$).

Annual revenue	No. of companies	Percentage
Small builder		
Less than ¥100 million (US\$780,000) ^a	328	72
Medium builder		
¥100 million to ¥2 billion (US\$780,000 to US\$16 million)	77	17
Large builder		
Over ¥2 billion (over US\$16 million)	52	11

^a US\$1 = ¥128.

Table 2. — Respondents by region ($n = 460$).^a

	No. of companies	Sample percentage	Regional % of total wood housing starts
Kanto	119	26	28
Kansai	90	20	14
Kyushu	107	23	9
Tohoku	99	21	14
Other	45	10	--
Total	460	100	65

^aPrefectures included in each region – Tohoku: Aomori, Iwate, Miyagi, Akita, Yamagata, Fukushima; Kanto: Tokyo, Kanagawa, Saitama, Chiba, Ibaragi, Gunma, Akagi; Kansai: Osaka, Hyogo, Kyoto, Shiga, Nara, Wakayama; Kyushu: Fukuoka, Saga, Nagasaki, Kumamoto, Oita, Miyazaki, Kagoshima, Okinawa.

Japanese industry experts and adjustments were made based on their observations. The Japanese draft was then translated back into English and no inconsistencies were found.

The survey was pre-tested at a Tokyo home show June 16 and 17, 2001. The clarity of the survey measured well with builders. Test respondents readily understood the survey directions and answered the questions properly.

The survey followed Dillman's (1978) mail research methodology. A comprehensive list of small, medium, and large residential construction companies was not obtainable and so two separate industry lists were used to develop the sample frame. First, the Japan Housing Newspaper provided a list of small- and medium-sized post and beam home builders who build up to 100 homes per year. Second, the Japan Lumber Journal List of Large Builders was used to reach large home builders who build over 100 homes per year.

The sample frame was comprised primarily of builders that built post and beam houses. Companies that built exclusively 2 by 4, prefab, and other types of houses were removed from the sample. However, those companies that built 2 by 4, prefab, and other types of houses, in addition to post and beam, were retained in the sample. Cluster sampling was used to divide Japan into four regions (Kanto, Kansai, Kyushu, and Tohoku) and a sample was taken from

each region. Two waves of 2,515 surveys each were mailed in July and September 2001. The approximate distribution of the 2,515 surveys was Tohoku 23 percent, Kanto 28 percent, Kansai 25 percent, and Kyushu 25 percent. There were 104 surveys returned as undeliverable or unusable, resulting in an effective sample size of 2,411. There were 461 usable surveys received, for a response rate of 19 percent. It is important to note that some of the respondents indicated that they build homes outside the sample frame regions or in multiple regions. Therefore, these companies were re-classified as an "other" region. Non-response bias was checked using the Armstrong and Overton method (1977). This method utilizes a t-test to test for significant differences between early respondents and late respondents, which are a proxy for non-respondents. No significant differences were found in any of the four constructs, indicating there was no non-response bias ($\alpha = .05$).

Results and discussion

Survey respondents were classified into small, medium, and large builders (Table 1). The sample was skewed toward smaller builders with 72 percent of the respondents generating less than US\$780,000 in estimated annual sales. However, this closely reflects Japan's residential construction industry where

the majority of houses are built by small builders.

Four of Japan's major regions were sampled (Table 2). These regions included 27 of Japan's 47 prefectures and made up 65 percent of all 2001 wood housing starts. Kyushu was slightly over represented compared with this region's total percentage of wood housing starts. Kyushu bias was checked by running a factor analysis with Kyushu respondents removed from the sample and comparing this to the factor analysis of the total sample. The results showed that each respective variable of the factor analysis with Kyushu respondents removed loaded on the same factors as the total sample factor analysis, indicating that Kyushu's slight over representation did not bias the overall sample.

Factor analysis

As just described, the measures of the ethnocentrism, market orientation, risk aversion, and price sensitivity constructs were based on established scales. However, these scales were modified to fit the residential construction industry, translated into Japanese, and then used in Japan. Therefore, before conducting the cluster analysis, a principal component factor analysis with a varimax rotation was run to confirm that the modified scales loaded on the same constructs as the original scales defined in the literature. Each variable was measured utilizing a Likert scale: 1 = strongly disagree and 7 = strongly agree (Table 3). Some survey questions were asked in reverse and were then reverse coded for the analysis. These variables were marked with an (R) in Table 3. A Bartlett's Test of Sphericity was used to confirm the presence of correlations among variables as required by factor analysis (Hair et al. 1998). This test result showed a high Chi square value, indicating there was ample correlation among the variables to run a factor analysis (Chi-square = 2331, $df = 136, p < .00$). Overall, the factors loaded as expected. However, two variables with factor loadings below .40 were dropped and the factor analysis was re-run (Hair et al. 1998).

After the two variables were dropped, the factor analysis reduced 17 variables into 4 underlying factors that explained 57.79 percent of the total variance (Table 4). Examination of the factor means revealed that the post and beam market segment was above the mid-point of 4.0 on all four factors. The mean score on

Table 3. — Factor loadings for attitude scales.

	Factor I: Ethno- centrism	Factor II: Market orientation	Factor III: Price sensitivity	Factor IV: Risk aversion
Our company uses sugi and hinoki because it suits Japanese-style construction better than imported lumber. ^a	.835	.017	.042	.138
Our company uses sugi and hinoki because Japanese customers appreciate its beauty more than imported species.	.863	-.012	-.083	.118
Our company purchases sugi and hinoki because we have established relationships with domestic suppliers.	.843	.074	.024	-.100
Our company prefers imported lumber over domestic lumber. (R) ^b	.450	-.220	-.100	.291
Our company purchases sugi and hinoki because the supplier service is better than for imported lumber.	.827	-.020	.024	-.055
Our company uses sugi and hinoki because it is important to support Japan's forest products industry.	.815	.114	.070	.071
When we find that our customers are unhappy with the quality of our service, we take corrective action immediately.	.019	.526	.142	.347
We periodically review our house designs to ensure they are what our customers want.	.030	.754	.024	.131
We measure customer satisfaction regularly.	.007	.816	.077	.037
The principles of market segmentation drive new house design efforts in our company.	.031	.692	.144	-.204
Our company buys the lowest priced lumber and building materials that meet our needs.	-.031	.110	.736	-.004
Our company chooses its suppliers based on their prices.	-.017	.112	.801	.029
When it comes to purchasing lumber and building materials, low price is the most important consideration.	.016	.031	.828	-.044
Our company takes on risky projects as long as the financial reward is high. (R)	.053	.254	.009	.677
Stability is more important to our company than high financial return.	.188	.186	-.028	.658
Our company aggressively seeks out new business ventures. (R)	-.130	-.226	-.054	.484
Our company tends to be more conservative than other builders.	.268	-.389	.122	.453

^aSugi = Japanese cedar; hinoki = Japanese cypress.

^b(R) = reverse coded.

Table 4. — Factor mean, standard deviation, and explained variance.

	Ethno- centrism	Market orientation	Price sensitivity	Risk aversion
Factor mean	4.60	5.19	4.81	5.13
Standard deviation	1.14	.93	1.17	.91
Percentage of explained variance (%) (total = 57.79)	22.57	14.02	11.49	9.71

the market orientation scale was 5.2, showing that the post and beam market segment overall is market orientated. These builders were also well above the mid-point on the risk aversion scale, showing that steady business is more important than pursuing risky projects. In addition, they were price conscious and slightly ethnocentric.

Market segmentation analysis

The market segmentation was performed by applying a cluster analysis to the results of the factor analysis. K-means cluster analysis is a multivariate statistical technique that segments data based on cluster centers (Hair et al. 1998). Unlike other methods, K-means

cluster analysis does not provide an optimal cluster solution. Instead, the researcher must evaluate different cluster combinations and determine which is the optimal solution. The factor means for three, four, and five cluster solutions were compared using an analysis of variance analysis. The three-cluster solution was found to be optimal because it provided statistical significance across all four factors using the least number of clusters (Table 5). The three clusters were analyzed and defined as the *conservative*, *open to import*, and *low price sensitivity* market segments based on their respective factor mean scores on the scale of 1 (strongly disagree) to 7 (strongly agree).

The *open to import* market segment comprised 29 percent of the sample respondents. The builders in this segment were differentiated from the other two builder segments by their willingness to use imported products. The *open to import* segment had a mean score of 3.67 on the ethnocentrism scale, which was below the 4.0 midpoint (Table 6). In contrast, the *conservative* and *low price sensitivity* market segments were both above the midpoint, suggesting that these builders prefer domestic species. The survey question within the factor that produced the highest variance was, "Our company uses sugi (Japanese cedar) and hinoki (Japanese cypress) because Japanese customers appreciate its beauty more than imported species" ($\alpha < .01$). The *open to import* market segment had a mean response of 3.62 on this question, while the *conservative* and *low price sensitivity* segments had mean scores of 5.91 and 4.62, respectively. The *open to import* market segment also had the highest mean score on the price consciousness scale. This indicates that the demand curve for this market segment is highly price elastic and that one appeal of imported wood products appears to be their lower price. Another distinguishing attribute of this segment was their high mean score on the market orientation scale. The *open to import* segment scored 5.49 on this scale, which was significantly higher than the 5.2 mean for the total sample.

The second market segment, *low price sensitivity*, was the largest market segment, comprising 41 percent of the sample. The *low price sensitivity* segment was characterized by its low score on the price consciousness scale (Table 6). The builders in this segment had a

Table 5. — Cluster or market segment membership.

	Open to import	Low price sensitivity	Conservative	Total
n	131	189	139	459
% of total	29	41	30	100

Table 6. — Cluster factor mean scores (1 to 7 scale).

	Open to import	Low price sensitivity	Conservative	F-value
Ethnocentrism ^a	3.67	4.50	5.63	180.16
Market orientation ^a	5.49 ^c	4.68 ^c	5.60	61.59
Price consciousness ^a	5.61 ^c	3.86	5.36 ^c	200.70
Risk aversion ^b	4.65	5.18	5.51	3.79

^aANOVA significant variance at the .01 level.

^bANOVA significant variance at the .05 level.

^cAll paired comparisons were significant at the .05 level using the Tukey HSD multiple comparison test except two pairs (*open to import* vs. *low price sensitivity* in the market orientation category and *open to import* vs. the *conservative* segment in the price consciousness category were not significant at the .05 level).

mean factor score of 3.86 on the price consciousness scale, which was significantly below the *open to import* and *conservative* market segments, which had scores 5.61 and 5.36, respectively. The identity of this market segment can be seen clearly in the builders' mean response to the survey question, "When it comes to purchasing lumber and building materials, low price is the most important consideration." Builders in the *low price sensitivity* market segment had a mean score of 3.48, which was significantly below the scale midpoint of 4.0. In stark contrast, the *open to import* and *conservative* market segments scored 5.45 and 5.05, respectively, which was significantly above the *low price sensitivity* segment. It appears that non-price factors such as supplier reliability and relationships play a relatively larger role in the purchasing decision of builders in the *low price sensitivity* market segment than for builders in the other two market segments. While still scoring above the midpoint of 4.0, builders in this market segment had the lowest mean score on the market orientation scale. The results imply that, relative to the other two market segments, the *low price sensitivity* market segment had more of a "push" sales strategy than a market orientation strategy. In other words, these builders tend to use the products that their suppliers offer rather than seeking out products that better satisfy the wants and needs of their customers.

The final cluster was defined as the *conservative* market segment due to its relatively conservative scores across the ethnocentrism, price consciousness, and risk aversion scales. This market seg-

ment comprised 30 percent of the respondents. The results show that the *conservative* market segment prefers to use domestic timber species and is the least likely to purchase imported products. In addition, they are relatively price conscious and the most risk averse of the three segments. It is interesting to note that this market segment scored the highest on the market orientation scale. Their desire to use domestic building materials may reflect a belief that this is the best way to meet the demands of their customers.

The demographic variables listed in Table 7 further reveal how to differentiate the *open to import* market segment from the other two. The average builder in this segment had been in business about 10 years less than the other two market segments. They built more houses per year and these houses were between \$10,000 and \$15,000 cheaper than the other two segments. The *open to import* segment also differentiated itself by more aggressively switching from traditional post and beam building to new rationalized post and beam building methods.

The rationalized post and beam method is differentiated from the traditional post and beam method by its use of products such as wall sheathing, engineered wood posts and beams, and metal connectors. Rationalized post and beam building systems are certified by a quasi-government organization called the Japan Housing and Wood Technology Center (HOWTEC 2005).

An average of 29 percent of the houses built by the *open to import* builders were

new rationalized post and beam houses, compared with 22.9 percent for the *low price sensitivity* segment and 14.9 percent for the *conservative* segment. These *open to import* builders were also more recently established, being in business about 10 years less than the other two segments.

The three market segments were compared across regions utilizing a Chi-square analysis. The results showed significant differences across regions. The one region that stood out from the rest was Kyushu. Kyushu's actual representation for the *open to import* segment was well below Kyushu's expected representation based on sample proportions. Conversely, Kyushu's actual representation in the *low price sensitivity* segment was significantly higher than would be expected based on sample proportions. Table 8 shows actual observed values over expected proportional values.

Managerial implications

The results of this research suggest several managerial implications for exporters wishing to target Japan's post and beam market. First, there is a segment within the post and beam market that is open to using imported materials and this market segment is approximately 29 percent of the total post and beam housing market. Second, these builders can be targeted directly. They are larger builders and it can be inferred from the average number of houses built per year that they do enough volume to import directly. Exporters can reduce the number of distribution channels and export directly to these builders, which will satisfy the need of these builders to supply their customers with affordable housing. Third, exporters should target the new rationalized post and beam housing market. The *open to import* segment is aggressively switching over from traditional methods to new rationalized post and beam methods. The best way to target the rationalized post and beam market is to get products certified through HOWTEC (2005). Finally, exporters should target Kanto, Tohoku, and Kansai regions before the Kyushu region.

The next managerial question is how to reach the *open to import* market segment. One suggestion is to find a comprehensive database of post and beam builders in Japan. A typical database would have approximately 10,000 listings. From the database, you can use the

Table 7. — Cluster membership means and standard deviation by demographic variables.^a

	Open to import	Low price sensitivity	Conservative	F-value
Years in business ^b	27.2 AB ^b (SD = 15.9)	36.1 B (SD = 23.3)	35.6 A (SD = 19.4)	8.44
Annual houses built ^c	162.4 (SD = 622.7)	54.6 (SD = 141.5)	90.6 (SD = 445.2)	2.46
Percent of new post and beam houses ^d	29.0% C (SD = 37.2%)	22.9% (SD = 33.7%)	14.9% C (SD = 27.4%)	6.00
Mean price of houses built (¥) ^c	¥20,684,324 D (SD = ¥5,893,502)	¥22,291,852 (SD = ¥6,453,681)	¥22,965,666 D (SD = ¥6,596,227)	3.63
Mean price of houses built (US\$) ^e	US\$161,596 (SD = US\$46,043)	US\$174,155 (SD = US\$50,419)	US\$179,419 (SD = US\$51,533)	--

^aValues sharing the same capital letter are significant at the .05 level using the Tukey HSD multiple comparison test.

^bSignificant variance at the .01 level.

^cSignificant variance at the .05 level.

^dSignificant variance at the .10 level.

^eUS\$1 = ¥128.

Table 8. — Cluster membership by region.^a

	Open to import	Low price sensitivity	Conservative	Total
	----- (observed n / expected n) -----			
Kanto	32 / 34.4	52 / 49.1	36 / 36.5	120 / 120
Kansai	26 / 25.8	36 / 36.8	28 / 27.4	90 / 90
Kyushu	15 / 30.1	56 / 43	34 / 31.9	105 / 105
Tohoku	35 / 28.4	34 / 40.5	30 / 30.1	99 / 99
Other	23 / 12.3	9 / 17.6	11 / 13.1	43 / 43
Total	131 / 131	187 / 187	139 / 139	457 / 457

^aChi Square = 28.4, df = 8, significant at the .01 level.

mean and standard deviation values in Table 7 to approximate a subset of builders that fall into the *open to import* segment. First, select companies from the database that have been in business for between 19 and 35 years (mean \pm 1/2 standard deviation). From this list, remove Kyushu region builders. Then select companies that build between 59 and 265 houses per year (mean \pm 1/6 standard deviation). Next, cross reference the remaining companies with a list available from HOWTEC (2005) of companies that are building new rationalized post and beam homes. Although not an exact science, this process will create a manageable subset of builders that has a strong probability of existing within the *open to import* segment defined in this paper.

Once these builders have been located, approach them via phone, fax, e-mail, or a trip to Japan. Establish a relationship, study their business, and introduce solutions your company can provide to help them satisfy their wants and needs. The *open to import* segment scored high on the market orientation scale. It can be in-

ferred from these results that they would be receptive to working together on brand development, creating product demand through shared advertising costs, product displays for showrooms, and co-operating on tradeshow. Japan has become a more competitive market, but it is still second only to the United States in wood housing starts. As competition increases, so does the need for sophisticated marketing.

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