

A MULTIVARIATE MODEL OF POWER IN THE RELATIONSHIP AMONG SUPPLIERS AND RESELLERS OF U.S. FOREST PRODUCTS ENTERING SELECTED MARKETS OF THE EUROPEAN UNION

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ABSTRACT

Issues relating to power in marketing decision-making in forests products trade are seldom analyzed and are poorly understood. Consequently, no reliable analytical models are in place. This paper presents the results of a univariate and a multivariate statistical analysis that describes power in the relationship between different types of intermediaries for three countries in the European Union (EU). Understanding this dimension of the channel relationship will assist forest products firms in developing effective policies for dealing with intermediaries in the EU.

To analyze power, a survey instrument identified eleven areas of responsibility/power among suppliers and resellers of U.S. hardwood, softwood, and softwood plywood in the United Kingdom, Germany, and the Netherlands. The results clearly illustrated that resellers from the EU countries perceived that they hold more responsibility/power than their U.S. suppliers over the majority of marketing decisions. In general, the results of a univariate analysis found that on a broad level there were major differences between resellers that took title versus resellers that did not take title. The largest differences between these two groups were among the variables associated with distribution and pricing.

The results of a multivariate analysis indicated that power among resellers can be summarized by two factors termed "Strategic Planning Responsibility" and "Service Responsibility." The analysis indicated that the difference in perceived power between resellers that take title versus those who do not take title is in the strategic planning dimension, where emphasis is on pricing and distribution responsibility.

Keywords: European Union, factor analysis, marketing, power, resellers.

INTRODUCTION

The European Union (EU) represents the largest market for U.S. forest products outside of North America, with exports valued at over \$1.2 billion in 1993 (Anon. 1994). The EU market is competitive and diverse with many companies and many sources (countries) competing for the same customers. Exportation to the EU can be achieved either through the use

of foreign resellers (agents, importer/distributors) or by establishing overseas marketing subsidiaries (manufacturers sales offices). For the majority of firms, the option of establishing a sales subsidiary in the EU may not be viable since the capital or sales potential may not exist. However, relying on resellers in the EU may result in the U.S. supplier having little power over the marketing of its products.

Two primary categories of resellers exist in the EU market for U.S. suppliers of forest products. The first category consists of firms that take title to the goods, termed importers, distributors, manufacturers, and merchants. The second category consists of firms that do not take title to the goods and work on a commission basis, termed agents. These groups provide alternate routes for reaching consumers in EU markets. The goal of this study was to assess the differences between these two types of channel members in terms of perceived levels of power over various marketing decisions.

In general, the variables used to measure power in previous studies were based on various features of product strategy, pricing strategy, promotion strategy, and distribution strategy. A survey instrument was designed to measure sources of exercised power in the relationship as perceived by the purchaser. Eleven variables, broadly based on the study by Butaney and Wortzell (1988), combined with the results of discussions with academic and industry specialists, and the results of personal interviews were listed:

1. Choosing geographic territories in which to sell products
2. Setting sales targets or goals
3. Setting prices to customers
4. Determining distribution policies for products
5. Establishing product return policies
6. Choosing customers
7. Determining pricing policies for products
8. Accommodating customer requests for product modifications
9. Providing presale customer services
10. Resolving customer related technical problems
11. Determining sales strategies/policies

The reseller was asked to evaluate each of the variables using an ordinal scale. Responses were analyzed using factor and discriminant analysis. Additional details are described below.

BACKGROUND

Definitions of power are fairly consistent throughout the literature. According to Lusch and Brown (1982), power in its most general sense refers to the ability of one individual or group to control or influence the behavior of another. Similarly, Stern and El-Ansary (1992) offer a definition, which has been widely accepted in the marketing literature, as the ability to control the decision variables in the marketing strategy of another member in a given channel at a different level of distribution. Power is exercised by one channel member over another channel member as distinct from the member's original level of control over its own marketing strategy.

Stern and Robicheaux (1974), proposed that power should be defined in terms of a relationship between two entities. They proposed that efforts to exert power and control are mutual as all channel members are interdependent. This suggests that each channel member will have at least some power. For example, while the manufacturer may have power over physical product and pricing, the reseller may have power over inventory and service levels to the customer (Stern and Robicheaux 1974). Iyer (1992), suggested that certain powers were specific to the different channel members. For example, the manufacturer may control pricing in some markets and the distributor might control inventory. In essence, both members can exercise control over different issues.

In measuring the power of distributors, Butaney and Wortzel (1988) developed a scale based on the level of perceived responsibility over certain marketing decisions. Power was measured as the extent of the distributor's freedom to make marketing decisions about the manufacturer's product. These decisions included variables such as pricing strategy, distribution strategy, and choosing customers. The more areas in which the distributor perceived that he had marketing decision responsibility, the more power the distributor was deemed to have. This study distinguished be-

tween potential and exercised power where potential power was broadly defined as the ability to alter one's behavior and exercised power was the actual alteration of one's behavior (Butaney and Wortzel 1988).

A firm's understanding of its level of power is important information. By knowing how much power other channel members have and what its own levels of power are, the firm can assess how much it can influence other channel members and the potential cost in doing so (Lusch and Brown 1982). These actions can be aimed at resellers (the indirect influencers) or the customers themselves. For example, in distribution, power must be used in implementing trade promotions, establishing channel support roles and standards, developing operational linkages, choosing channel partners, providing channel training, implementing joint sales programs, developing customer and channel information systems, coordinating after-sale support programs, and developing reward and compensation arrangements (Stern and El-Ansary 1992). These activities are critical to channel management.

METHODS

Sample and sampling procedure

A judgment sample consisting of resellers in the U.K., the Netherlands, and Germany that act as intermediaries for U.S. forest products (solid wood products or wood composites) was chosen. It was anticipated that these resellers transacted either directly from the United States or indirectly (through intermediaries). Resellers were selected from all available lists of importers, distributors, manufacturers, agents, traders, and other organizations that acted as resellers for U.S. forest products. The final mailing list was produced by checking with membership lists from the American Hardwood Export Council (AHEC), APA—the Engineered Wood Association, the Southern Forest Products Association, and the Western Wood Products Association (WWPA) and were examined by personnel from these associations in the EU to ensure that no known

major resellers were absent. The final mailing lists consisted of 216 resellers in the United Kingdom, 178 resellers in Germany, and 58 resellers in the Netherlands.

The sampling unit was the individual in his or her organizational capacity; thus, the "key informant" method was used whereby views expressed by the respondent were assumed to represent organizational strategy. The "key informant" method has been used successfully in previous distribution channel studies (e.g., Etgar 1976; Hunt and Nevin 1974; Lusch and Brown 1982; Butaney and Wortzel, 1988). The structured questionnaire was mailed to the individual in each firm with responsibility for purchasing decisions. In the cover letter, respondents were encouraged to check with others when completing the questionnaire, or to pass the questionnaire to others if they did not feel qualified to answer the questions accurately. Therefore, the data represented the perceptions of one channel member, the reseller (distributor, agent, etc.), obtained from one key informant in each firm.

Error in this type of survey derives from several sources, including the potential of positional bias, ignorance of facts, and the complex social judgments required of the key informants. In keeping with the advice of Phillips (1981), steps were taken to minimize the potential sources of errors:

1. Respondents had to satisfy the following criteria:
 - (a) they must have responsibility for purchasing decisions and/or,
 - (b) they must have been familiar with the firm's marketing relationships with the supplier of U.S. forest products.
2. Information was collected from resellers based on their most important supplier of U.S. forest products. The objective was to improve the reliability of the responses and generality of the results.

The resellers (intermediaries) were required to evaluate each of the eleven variables on a five-point scale ranging from 1, "I have almost complete responsibility," to 3 "Respon-

sibility shared," to 5, "The supplier has almost complete responsibility." The respondent was required to leave a blank where he perceived neither party to have responsibility over a particular marketing decision. The scale used to measure responsibility was ordinal. However, in keeping with the recommendation of Kerlinger (1964) and McDaniel and Gates (1993), ordinal data were treated as if they were interval or "quasi-interval" data. This approach permitted the use of more powerful and sophisticated statistical tests. Respondents were also asked to supply some general information relating to channel structure, product information, demographic factors, and some additional relationship factors.

Data collection

Several versions of the mail survey instrument were prepared. The Dutch and U.K. resellers received an English version of the questionnaire, while German resellers received a German language version. The choice of English for the Dutch was based on the advice of industry and academic specialists who noted that many Dutch resellers frequently conduct business affairs in English. The German version was translated from the English and back-translated by a separate translator to ensure correct expression and intent. The pilot instrument was pretested among selected groups of purchasers in the U.K. Face and content validity were achieved by analysis of the pretest results. The pilot instrument was also reviewed by academic experts, by individuals familiar with the markets, and by members of top U.S. trade associations in Europe who evaluated survey content and clarity. The questionnaire was then amended as appropriate.

Postage-paid return envelopes were provided to facilitate an increased response rate, and 452 questionnaires were mailed. A second mailing of the questionnaire to nonrespondents took place approximately 4 weeks after the initial mailing. A final mailing of a reminder was mailed approximately 7 weeks af-

ter the initial mailing. Two hundred and thirty-five questionnaires were returned, yielding a response rate of 52%. Of the 235 questionnaires, 166 responded that they purchase (or resell) U.S. forest products. This constituted 35% of the original sample. All respondents were managing directors/chief operating officers (CEOs), purchasing managers, or other senior management. These individuals had responsibility over the decisions affecting purchasing of U.S. forest products.

The potential for nonresponse bias was considered. A common way to address this concern is to compare early respondents with those who respond after follow-up letters and repeat mailings (Fowler 1984). Responses returned after the first mailing were compared to responses returned after subsequent mailings on several key demographics using a Mann-Whitney *U*-test at the 0.05 level (Wilkinson et al. 1992). No significant differences were found in the distributions of early and late respondents. This result, combined with the relatively large response rate, deemed the possibility of nonresponse bias unlikely.

Data analysis

The returned surveys were checked for incomplete data or response inconsistencies, and sixty-four were found unusable for analysis. Surveys with many unanswered questions were the main cause of unusable responses. After the unusable responses were discarded, 102 surveys were deemed appropriate for the analysis. Means were initially calculated to provide a relative weighting of the responsibility variables. These were graphed to illustrate perceived levels of responsibility by variable. In order to simplify the concept of power, it was decided to carry out a series of multivariate tests to ascertain if the data contained within the original eleven variables could be summarized further.

Figure 1 outlines the multivariate statistical procedures used to measure power from the data obtained. After data collection, a Mahalanobis distance (d^2) test was applied to the raw

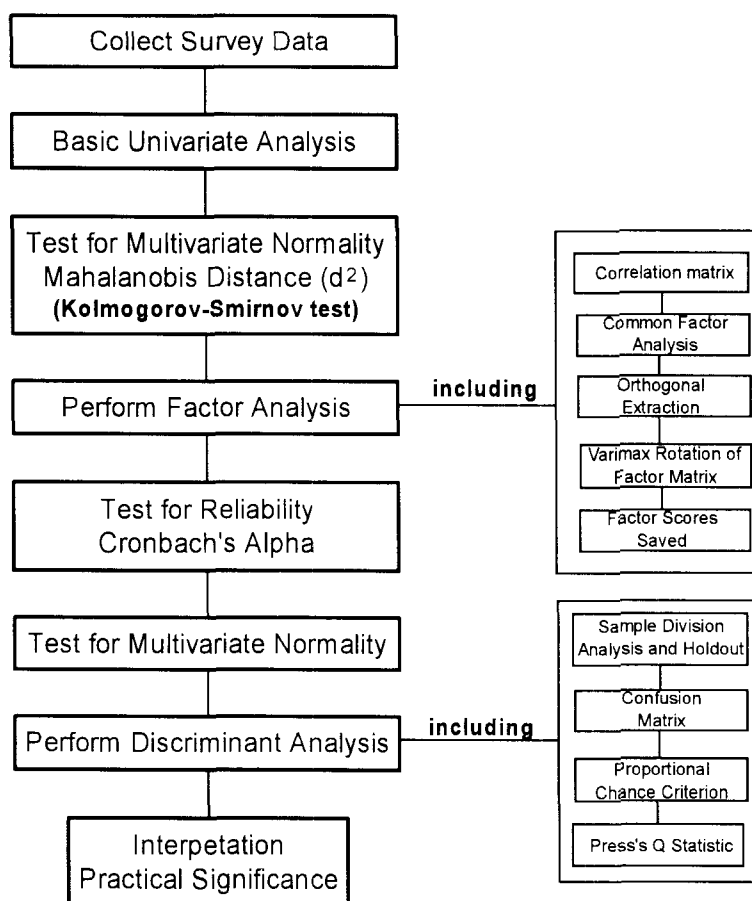


FIG. 1. Outline of multivariate analysis.

data to assess the multivariate normality of the multi-item scale (Eq. 1). In this test, the data were summarized by scaling responses in terms of standard deviations, and adjustments were made for the intercorrelation between the variables (Johnson and Wichern 1988).

$$d_j^2 = (X_j - X_{\text{bar}})' S^{-1} (X_j - X_{\text{bar}}) \quad (1)$$

where:

$$j = 1, 2, \dots, n$$

X_1, X_2, \dots, X_n are the sample observations

d^2 = squared distance (standardized form of Euclidean distance)

S = sample variance/covariance matrix

X_{bar} = vector for mean values of x .

If the parent population were multivariate normal and both n and $n-p$ (p = number of variables in analysis) were greater than 30, each of the squared distances $d_1^2, d_2^2, d_3^2, \dots, d_n^2$ should behave like a chi-square random variable (Johnson and Wichern 1988). When plotted as a chi-square distribution, a straight line should result if multivariate normality were achieved. In addition to these plots, a Kolmogorov-Smirnov test was applied to the d^2 values. In the Kolmogorov-Smirnov test, the values of d^2 were tested as a chi-square distribution with n degrees of freedom where n is equal to the number of variables.

Principal component factor analysis was used to summarize the original variables measuring reseller responsibility (power) into a

minimum number of factors. The essential purpose of the factor analysis was to describe, if possible, the covariance relationships among variables in terms of a few underlying, but unobservable, random quantities called factors (Johnson and Wichern 1988). Initially the factor procedure calculated a correlation matrix. From this, a set of factors were derived based on the correlations between the variables. The reference axes of the factors were then rotated about the origin to distribute the variance, rather than having most of the variation accounted for by the first factor. The VARIMAX method of rotation was used since it has proven very successful as an analytic approach to obtaining an orthogonal rotation of factors in previous studies (Hair et al. 1992; Smith and Bush 1995; Bush and Sinclair 1991). Factor loadings were derived that represented a correlation between an original variable and its factor. The level of loading that is considered significant varies among researchers. The authors followed a conservative significance level of 0.40 recommended by Hair et al. (1992).

The PROC FACTOR procedure was used in SAS to perform the factor analysis. Reliability of the various factor models was assessed by the application of Cronbach's coefficient alpha (Peter 1979). This determines the mean reliability coefficient for all possible ways of splitting an item in half. The cutoff point for reliability was an alpha value less than 0.60 (Churchill 1979; Peter 1979). An ALPHA type factor analysis in SAS automatically calculated the alpha coefficients for the factors created in this analysis.

After the factor analysis, a discriminant analysis was used to build and to test the reduced factor model of power. The objective of the discriminant analysis was to determine if the factors could discriminate well between resellers that took title to goods and resellers that did not take title to the goods. The rationale behind this approach was that if this model were sufficient to measure power, then it should be able to discriminate between different types of resellers that were already shown to behave differently from the nonparametric

analysis of the means. Half of the sample, the analysis sample ($n = 51$), was used to develop the discriminant function. The other half, the holdout sample ($n = 51$), was used to test the discriminant function.

Finally, chance model criteria were calculated to indicate the classification of the discriminant function. The proportional chance criterion was the appropriate chance model to use for these data, as sample sizes were unequal and the objective was to identify members of both groups correctly (Hair et al. 1992). The maximum chance criterion was also calculated. The maximum chance criterion is the percentage correctly classified if all observations are placed in the group with the greatest probability of occurrence. The final measure of classification accuracy was Press's Q statistic (Hair et al. 1992).

RESULTS AND DISCUSSION

Figure 2 shows the results of the analysis of perceived levels of responsibility by variable. This clearly illustrates that resellers from the EU countries surveyed perceive that they hold more responsibility over the majority of marketing decisions than their U.S. suppliers. Based on the univariate analysis, the following points are relevant:

- U.S. suppliers have little responsibility in choosing final geographic territories. However, a significant difference was found between types of resellers, with those that take title having more responsibility in choosing territories than those that do not. With the relinquishing of power when title is transferred, it seems that U.S. suppliers are also giving away the right to choose the final geographic territories into which their products will travel.
- Interestingly, EU resellers were found to have more responsibility than U.S. suppliers for setting sales targets or goals. This result tends to indicate that the geographic and cultural distance that separates the U.S. supplier from the final market results in a relinquishment of responsibility regarding se-

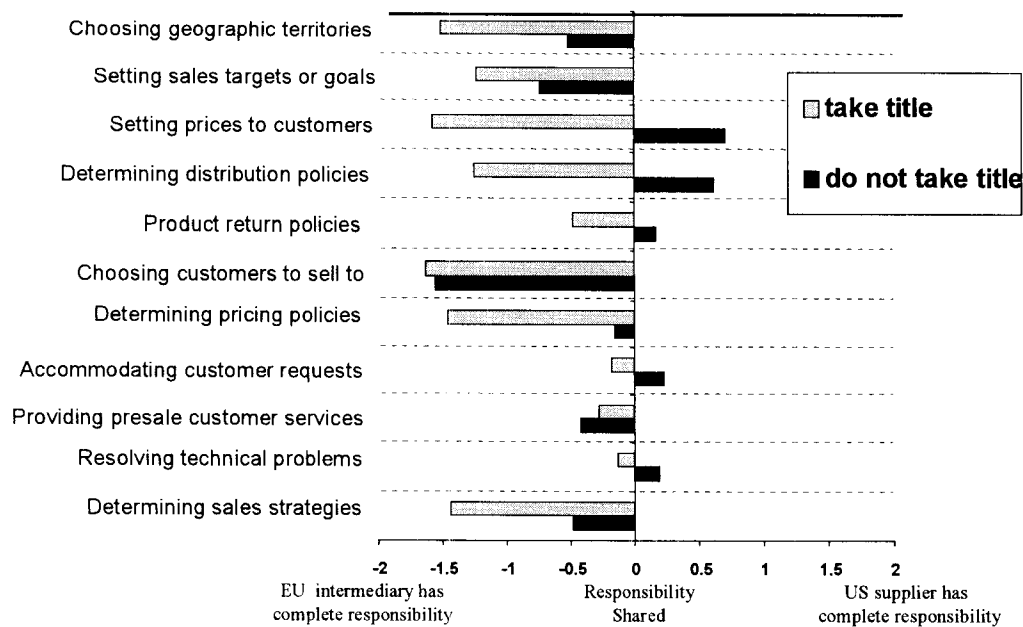


FIG. 2. Perceived marketing and decision-making power (All markets).

lected elements of strategy. Resellers that took product title perceived that they had more responsibility than resellers that did not take title for setting sales targets.

- Two variables dealt specifically with pricing in this analysis. In general, respondents perceived that U.S. suppliers retained more responsibility than EU resellers when title was not transferred. The transference of title by U.S. suppliers seems to result in the relinquishment of responsibility for pricing decisions. This may be because pricing decisions in the international environment are often more complicated than in the domestic market, due to factors such as government influence, different currencies, and additional costs.
- The results indicated that the transference of title had a major influence in responsibility over distribution policies. Resellers that took title for U.S. products perceived that they had much more responsibility for distribution policies than their U.S. suppliers, whereas resellers that do not take title perceived that their U.S. suppliers retained more responsibility.

- Product return policies are more complicated in international transactions than in the domestic market. The univariate analysis indicates that responsibility is generally shared between both parties. However, resellers that took title perceived that they had more responsibility for product return policies than resellers that did not take title.
- EU resellers perceived that they have almost complete responsibility for choosing customers. Again, the geographic and cultural distance that exists between U.S. suppliers and the final EU customers may prohibit direct linkages in many cases, and seems to result in the EU reseller having responsibility for choosing customers to match the products available.
- Both parties in the relationship are partially responsible for identifying and implementing product modifications. Providing the right product is a core requirement for international success. Specific product requirements in overseas markets can be substantially different than in those in the domestic U.S. market. For example, product modifications may necessitate the machin-

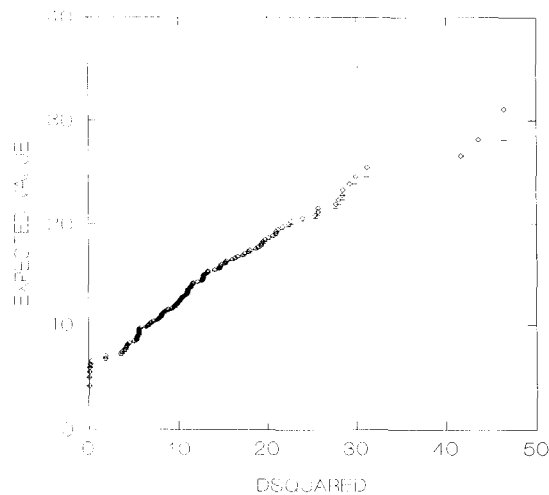


FIG. 3. Multivariate normality plot of the original eleven variables.

ing of lumber to metric sizes, the altering of moisture content levels, and color matching to specified requirements.

- U.S. suppliers and EU resellers were jointly responsible for the provision of presale customer services. However, resellers perceived that they had marginally more responsibility than their U.S. suppliers. Again, geographic and cultural distance may be factors inhibiting U.S. suppliers from forming close relationships with final customers, particularly in the early stages of the relationship.
- The resolving of technical problems was the joint responsibility of both EU resellers and U.S. suppliers. As the products in this study originate with U.S. suppliers, the technical solutions to problems must also begin in the United States. It was found that solutions to technical difficulties could be found through cooperation between both parties.
- Finally, the determination of sales strategies/policies (the extent to which elements of the marketing mix—product, price, promotion, and distribution are decided) is a key issue in international marketing. The EU reseller that took title perceived that he had almost complete responsibility in determining sales policy. Even resellers that did

TABLE 1. Kolmogorov-Smirnov multivariate normality test results.

	# of cases	Max difference	Probability (2-tail)	Multivariate normal
11 Variables (Original data)	102	0.202	0.000	NO
2 Factor solution (Principal component factor analysis)	102	0.620	0.773	YES

not take title to products perceived that they had more responsibility than their U.S. suppliers.

A Mann-Whitney *U*-test found that eight of the original eleven variables were significantly different between resellers that took title versus resellers that did not take title at the 5% level. The largest differences between the two groups were among the variables associated with distribution and pricing. This makes intuitive sense insofar as firms that do not take title would logically not be expected to have the same level of power over important decision-making activities in these areas as compared to resellers that take title. In general, the results of this univariate analysis found that on a broad level there were major differences between the two groups.

A Kruskal-Wallis test was used to determine if there were any notable differences in perceived power by variable between the three markets under review. A significant difference was found in only two variables at a 5% alpha level, but these were nonsignificant at a 1% alpha level. It was therefore deemed appropriate to use combined data from the three markets for the multivariate analysis.

Multivariate normality of the data was tested and rejected when a Mahalanobis distance test was applied (Fig. 3). The results of the Kolmogorov-Smirnov Test (Table 1) further illustrated that the original variables were not multivariate normal. Based on these results, and the desire to reduce the construct to a more simplified set of dimensions, a factor analysis was undertaken. The most commonly accepted formula for assessing the reliability

TABLE 2. Two factor solution with Varimax rotation.

Variable	Factor 1 Strategic planning responsibility	Factor 2 Customer service responsibility	Communality
Establishing prices to customers	0.87*	0.03	0.56
Determining pricing policies for products	0.80	0.04	0.12
Choosing geographic territories in which to sell products	0.74	-0.09	0.76
Determining distribution policies for products	0.67	0.31	0.55
Determining sales strategies/policies	0.66	0.14	0.35
Choosing customers to sell to	0.57	0.17	0.63
Setting sales targets or goals**	0.35	0.02	0.40
Accommodating customer requests for product modifications	0.20	0.83	0.73
Providing presale customer services	-0.08	0.83	0.70
Resolving customer related technical problems	0.01	0.81	0.66
Product return policies	0.38	0.51	0.46
Eigenvalue	3.47	2.46	5.92
Total Variance explained (%)	31.5	22.4	53.8
Cronbach's Alpha (Reliability)	0.96	0.75	

N = 128.

* Bold type denotes the variables used to form the sub-measure.

** Indicates loading too low to be considered significant.

in factor analysis is Cronbach's alpha (Peter 1979). This determines the mean reliability coefficient for all possible ways of splitting a measurement scale with multipoint items in half. Of the several Principal Component Factor Analysis models attempted, only a two-factor

tor solution could be deemed reliable when the Cronbach's alpha scores were analyzed.

Table 2 outlines the results of the factor analysis. The two factors explain 53.8% of the total variance. Factor 1 consists of six variables. They include: establishing prices to customers, determining pricing policies for products, choosing geographic territories in which to sell products, determining distribution policies for products, determining sales strategies/policies, and choosing customers. Factor 2 consists of four variables including: accommodating customer requests for product modifications, providing presale customer services, resolving customer-related technical problems, and product return policies. The variables in the two factors were examined to ascertain if the mathematical relationships made sense intuitively. It was observed that the first factor contained variables emphasizing marketing strategy, with pricing policy and distribution policy the dominant characteristics. This factor was therefore given the title "Strategic Planning Responsibility." The second factor consisted of customer support related issues such as "accommodating customer requests for product modifications" and "providing presale customer services." This factor was

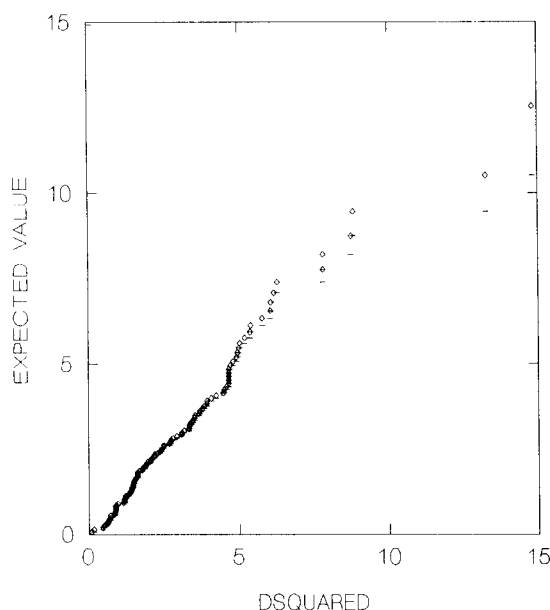


FIG. 4. Multivariate normality plot of two-factor solution.

TABLE 3. *Results of discriminant analysis on two factor model.*

Responsibility/power	F-ratio	Significance level	Discriminant loadings	R ²
Factor 1: Strategic planning responsibility	23.595	0.0001	0.9893	0.3250
Factor 2: Service responsibility	0.101	0.7519	-0.0787	0.0021

Multivariate significance level = 0.0001.
Percent Correctly Classified (Hit Ratio) (%).
Analysis Sample 82.3.
Holdout sample 80.39.
Maximum Chance Criterion 70.58.
Proportional Chance Criterion 58.47.

given the title "Customer Support Responsibility." Multivariate normality was tested and achieved on the two factor solution (Fig. 4 and Table 1).

Discriminant analysis was used to assess whether the two factor model of power could be used to discriminate between firms that take title versus firms that do not take title. The results are presented in Table 3. The classification accuracy of the holdout sample was 80.39%, which is 37.5% higher than the proportional chance criterion of 58.5%. This indicates that the discriminant model was very successful in discriminating between the two groups. Finally, the Press' Q statistic for the analysis sample was 21.35, and for the holdout sample was 18.84. The critical level at the 1% significance level is 6.63. It was therefore concluded that the predictions of the discriminant analysis were significantly better than chance.

The analysis indicated that the difference in perceived power between resellers that take and do not take title is in the strategic planning dimension, where emphasis is on pricing and distribution responsibility. An examination of the means indicates that resellers that take title to products perceive that they have a higher level of decision-making responsibility than resellers that do not take title. However, these data indicate that in terms of services responsibility, there are no perceived differences between these two groups.

CONCLUSIONS

The results illustrate that U.S. suppliers of forest products have little responsibility/power

over marketing decisions in the EU markets reviewed. U.S. suppliers tend to act as a manufacturing base, while important marketing decisions are made abroad. However, it was shown that the efforts to exert power and control are mutual and all channel members are to some degree interdependent. This indicates that each channel member will have some power, and members can exercise different levels of control over separate issues.

If a U.S. supplier has an interest in exporting, and wants to have an increased level of responsibility over strategic decisions, the results suggest that an agent is the most appropriate intermediary to use when entering the EU market. However, it should be noted that agents who work on behalf of U.S. suppliers perceive that they have higher responsibility/power than their U.S. suppliers in almost all the aspects of marketing measured in this study. U.S. exporters of forest products should consider the use of a distributor/importer if marketing beyond the level of an EU intermediary is not an objective.

Various other strategies exist that will increase a U.S. suppliers' marketing responsibility/power in the EU markets reviewed. The setting up of sales offices and/or the setting up of manufacturing plants within these markets are two well-used strategies. In this regard, most of the major U.S. forest products firms including Georgia Pacific, Louisiana Pacific, Willamette Industries, and International Paper have shown their interest in acquiring greater marketing power by implementing these strategies over the past decade.

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